US009177605B2

(12) **United States Patent**
Minnick et al.

(10) **Patent No.: US 9,177,605 B2**
(45) **Date of Patent: Nov. 3, 2015**

(54) **RECORDING OF MULTIPLE TELEVISION CHANNELS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/799,604**

(22) Filed: **Mar. 13, 2013**

(65) **Prior Publication Data**

US 2013/0243397 A1 Sep. 19, 2013

Related U.S. Application Data

(60) Provisional application No. 61/611,483, filed on Mar. 15, 2012.

(51) **Int. Cl.**
H04N 5/76 (2006.01)
G11B 27/28 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G11B 27/28*** (2013.01); ***H04N 5/4401*** (2013.01); ***H04N 5/50*** (2013.01); ***H04N 5/76*** (2013.01); ***H04N 5/775*** (2013.01); ***H04N 5/782*** (2013.01); ***H04N 5/91*** (2013.01); ***H04N 9/79*** (2013.01); ***H04N 9/797*** (2013.01); ***H04N 9/87*** (2013.01); ***H04N 21/4147*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 5/782; H04N 21/4334; H04N 21/47214; H04N 5/44543; H04N 5/76
See application file for complete search history.

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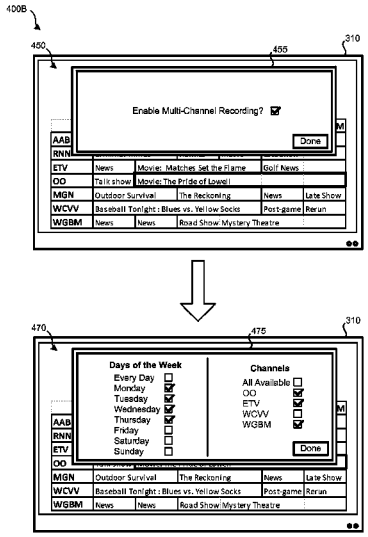
(57) **ABSTRACT**

A first user interface may be presented comprising a single selection option that enables recording of multiple television channels. A first user input, in response to the first user interface may be received enabling the option for recording of the multiple television channels. Data indicating a time period during which a television channel of the multiple television channels is to be recorded may be received from a television service provider. A record timer for the television channel of the multiple television channels may be set based on the user input enabling recording of multiple television channels and the data indicating the time period. The television channel of the multiple television channels may be recorded based on the record timer.

8 Claims, 10 Drawing Sheets



(51) **Int. Cl.**

H04N 5/91	(2006.01)
H04N 5/50	(2006.01)
H04N 9/87	(2006.01)
H04N 9/79	(2006.01)
H04N 21/472	(2011.01)
H04N 9/797	(2006.01)
H04N 5/782	(2006.01)
H04N 21/426	(2011.01)
H04N 21/433	(2011.01)
H04N 5/44	(2011.01)
H04N 21/4147	(2011.01)
H04N 21/43	(2011.01)
H04N 21/458	(2011.01)
H04N 5/775	(2006.01)
H04N 21/482	(2011.01)
H04N 7/20	(2006.01)

(52) **U.S. Cl.**

CPC ***H04N 21/4263*** (2013.01); ***H04N 21/4302*** (2013.01); ***H04N 21/4334*** (2013.01); ***H04N 21/4583*** (2013.01); ***H04N 21/47214*** (2013.01); ***H04N 21/47217*** (2013.01); ***H04N 21/482*** (2013.01); *H04N 7/20* (2013.01); *H04N 21/4826* (2013.01)

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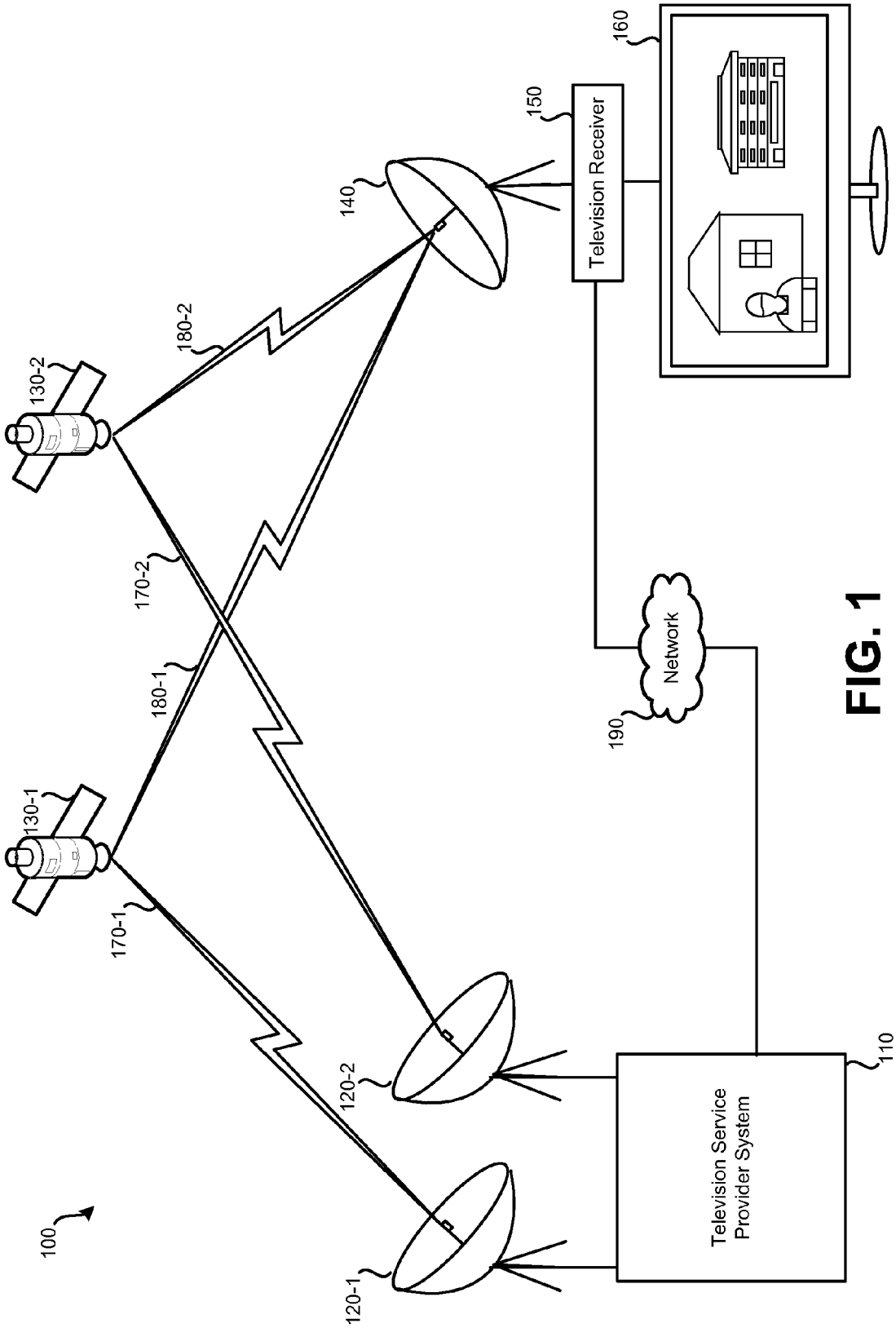
100
130-1
130-2
170-1
170-2
180-1
180-2
120-1
120-2
140
150
Television Receiver
160
190
Network
110
Television Service Provider System

FIG. 1

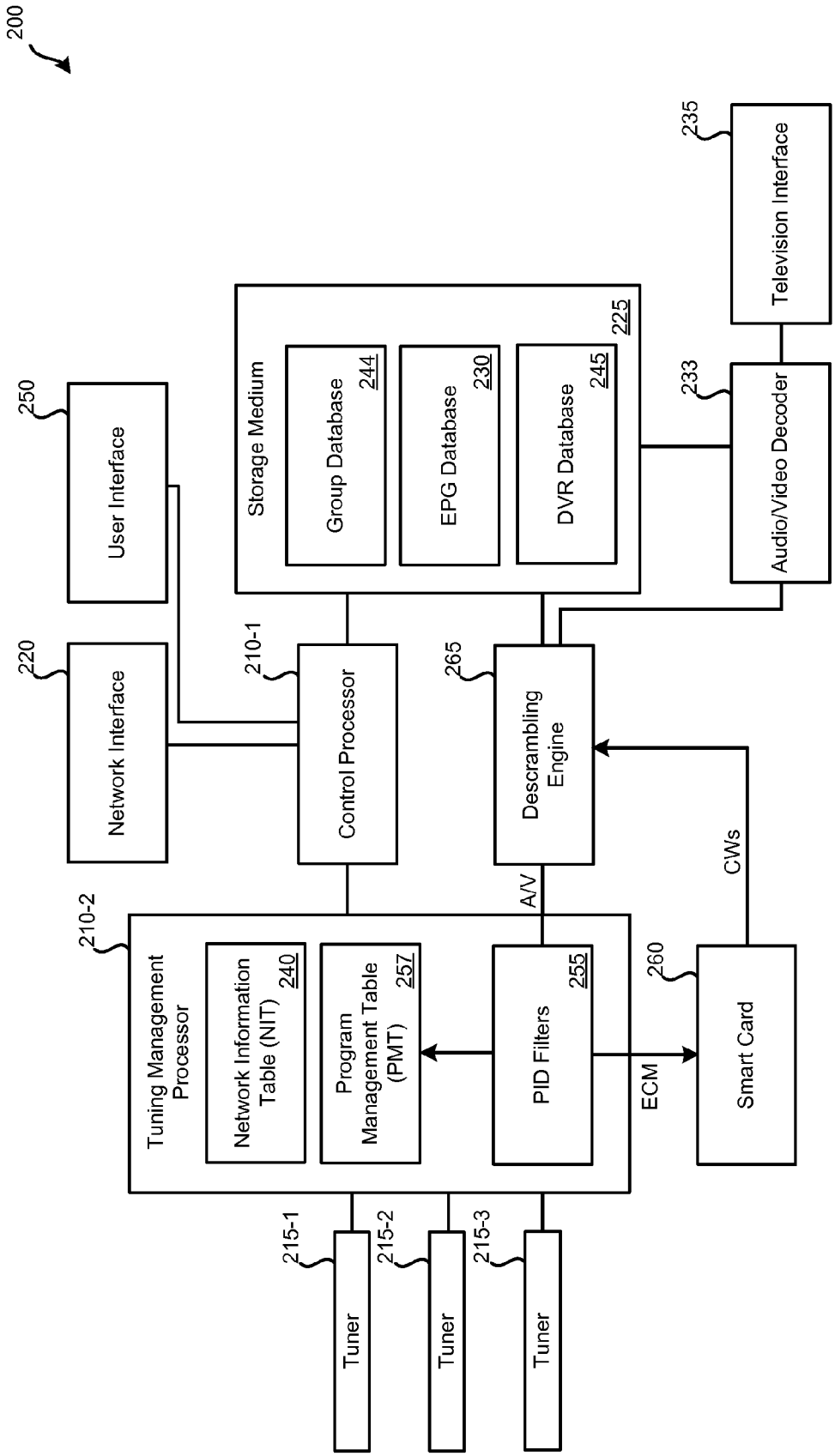
200
250
User Interface
220
Network Interface
210-1
Control Processor
Storage Medium
225
Group Database
244
EPG Database
230
DVR Database
245
265
Descrambling Engine
233
Audio/Video Decoder
235
Television Interface
210-2
Tuning Management Processor
Network Information Table (NIT)
240
Program Management Table (PMT)
257
PID Filters
255
A/V
ECM
CWs
260
Smart Card
215-1
Tuner
215-2
Tuner
215-3
Tuner

FIG. 2

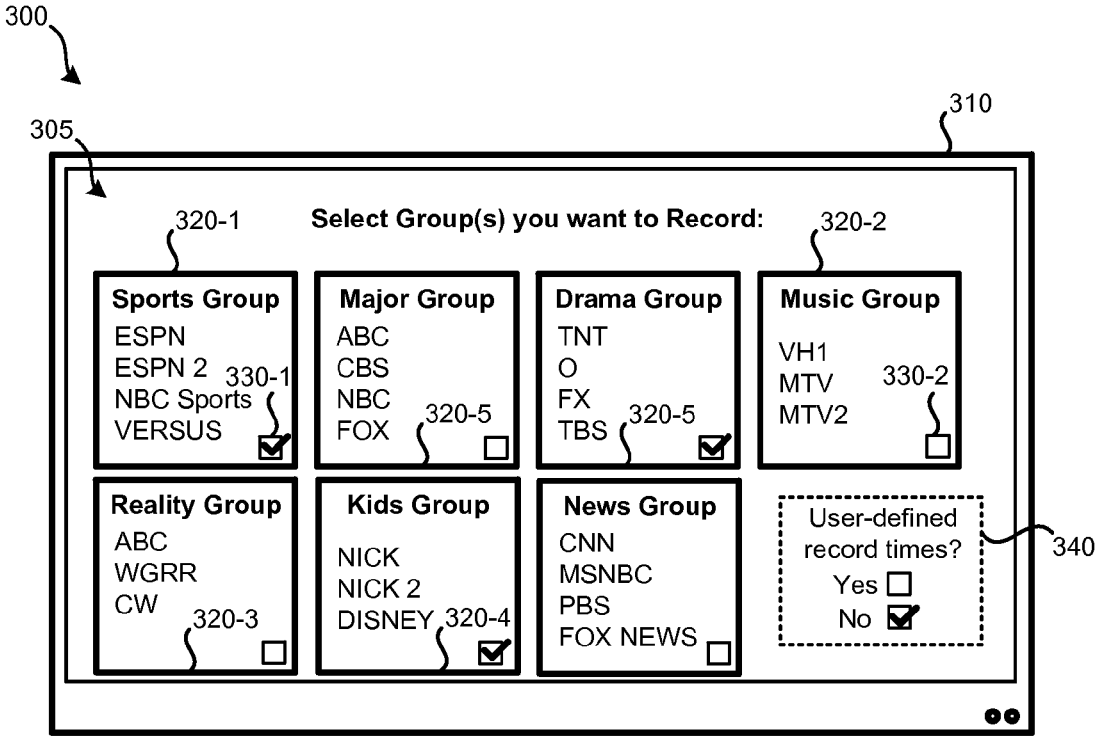
300
305
310
Select Group(s) you want to Record:
320-1
320-2
Sports Group
ESPN
ESPN 2
NBC Sports
VERSUS
330-1
Major Group
ABC
CBS
NBC
FOX
320-5
Drama Group
TNT
O
FX
TBS
320-5
Music Group
VH1
MTV
MTV2
330-2
Reality Group
ABC
WGRR
CW
320-3
Kids Group
NICK
NICK 2
DISNEY
320-4
News Group
CNN
MSNBC
PBS
FOX NEWS
User-defined record times?
Yes
No
340

FIG. 3

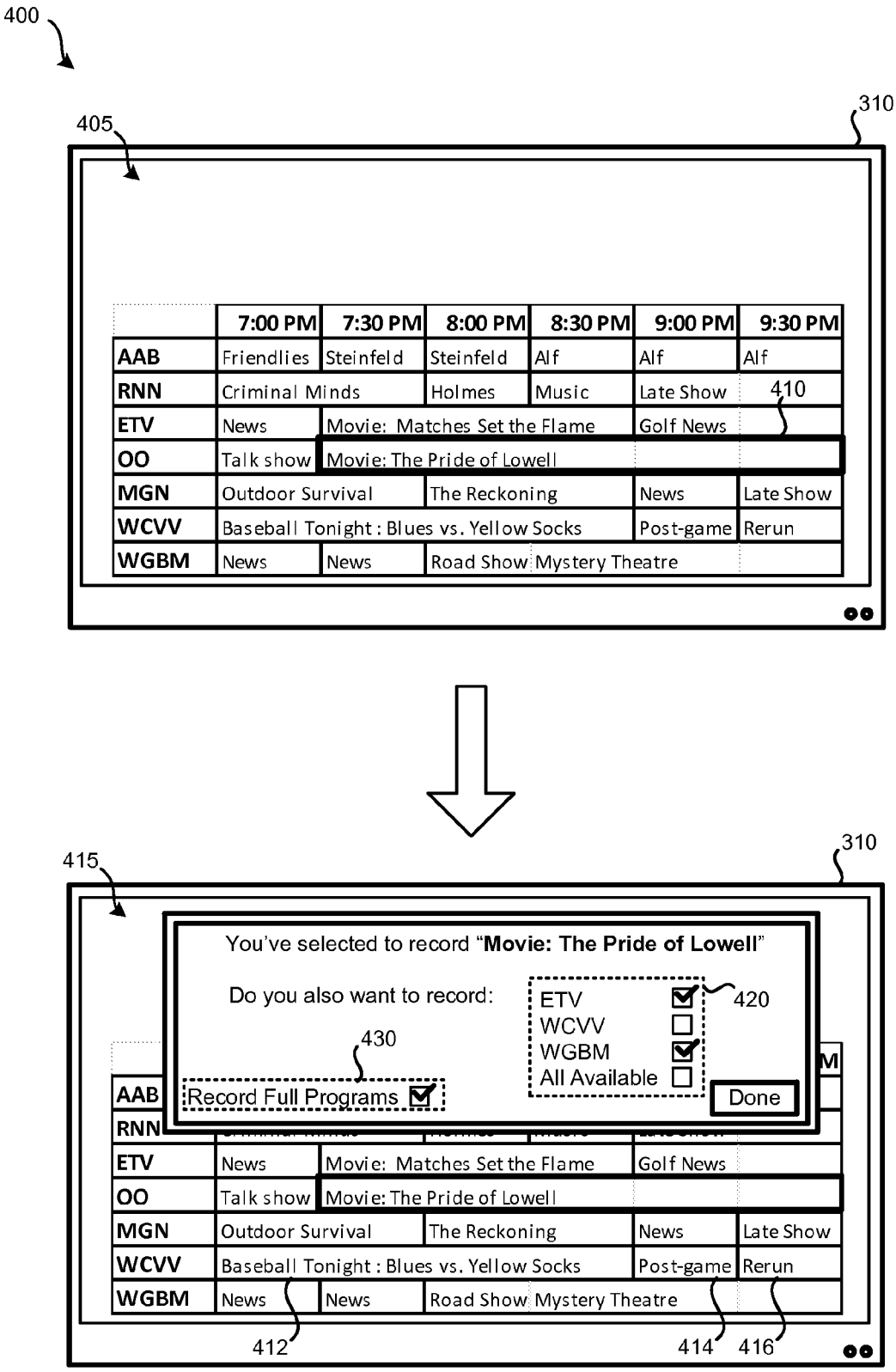
400
405
310
7:00 PM
7:30 PM
8:00 PM
8:30 PM
9:00 PM
9:30 PM
AAB
Friendlies
Steinfeld
Steinfeld
Alf
Alf
Alf
RNN
Criminal Minds
Holmes
Music
Late Show
410
ETV
News
Movie: Matches Set the Flame
Golf News
OO
Talk show
Movie: The Pride of Lowell
MGN
Outdoor Survival
The Reckoning
News
Late Show
WCVV
Baseball Tonight : Blues vs. Yellow Socks
Post-game
Rerun
WGBM
News
News
Road Show
Mystery Theatre
415
310
You've selected to record "Movie: The Pride of Lowell"
Do you also want to record:
ETV
WCVV
WGBM
All Available
420
430
Record Full Programs
Done
412
414
416

FIG. 4

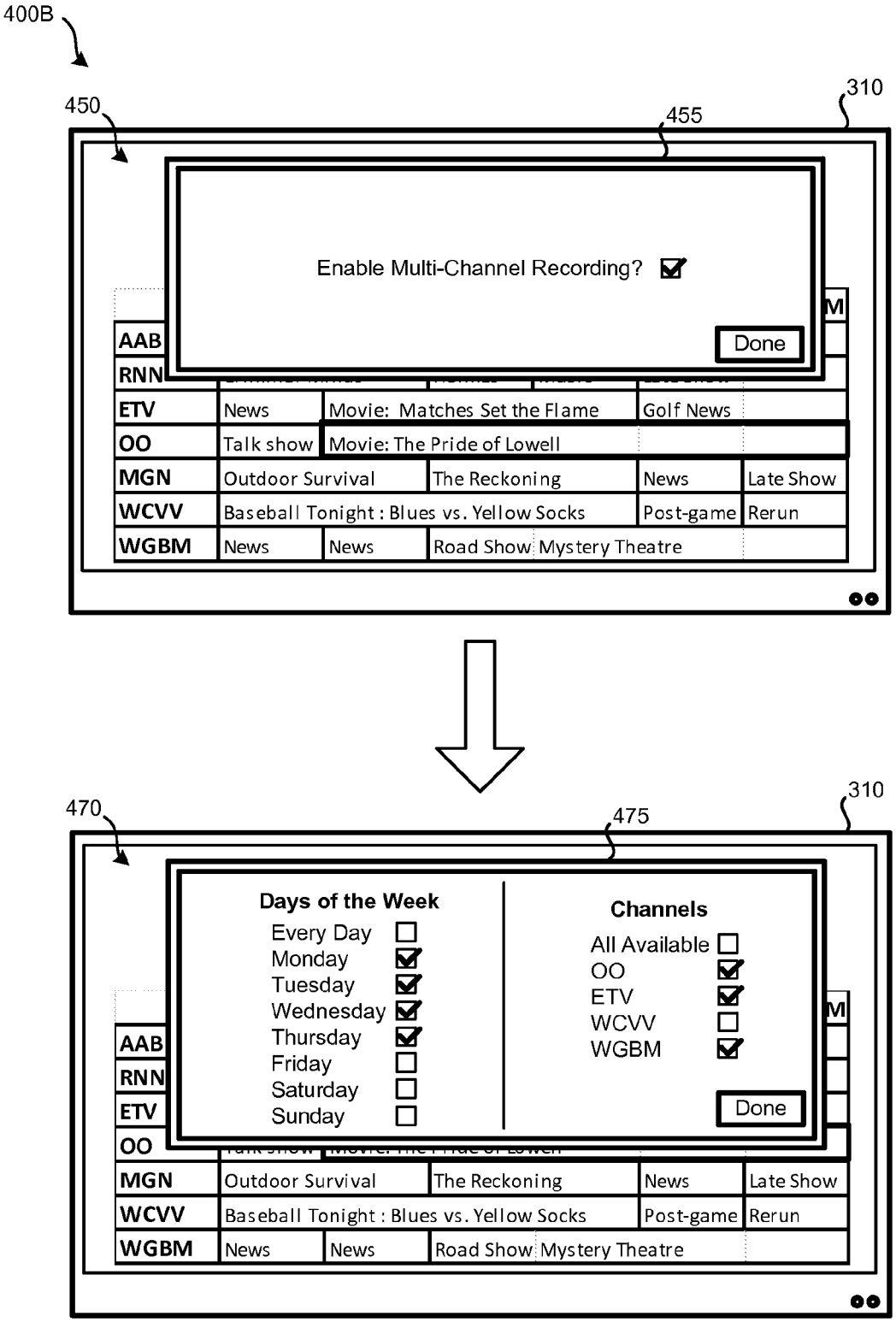
400B
450
455
310
Enable Multi-Channel Recording?
Done
AAB
RNN
ETV
News
Movie: Matches Set the Flame
Golf News
OO
Talk show
Movie: The Pride of Lowell
MGN
Outdoor Survival
The Reckoning
News
Late Show
WCVV
Baseball Tonight : Blues vs. Yellow Socks
Post-game
Rerun
WGBM
News
News
Road Show
Mystery Theatre
470
475
310
Days of the Week
Every Day
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Channels
All Available
OO
ETV
WCVV
WGBM
Done

FIG. 4B

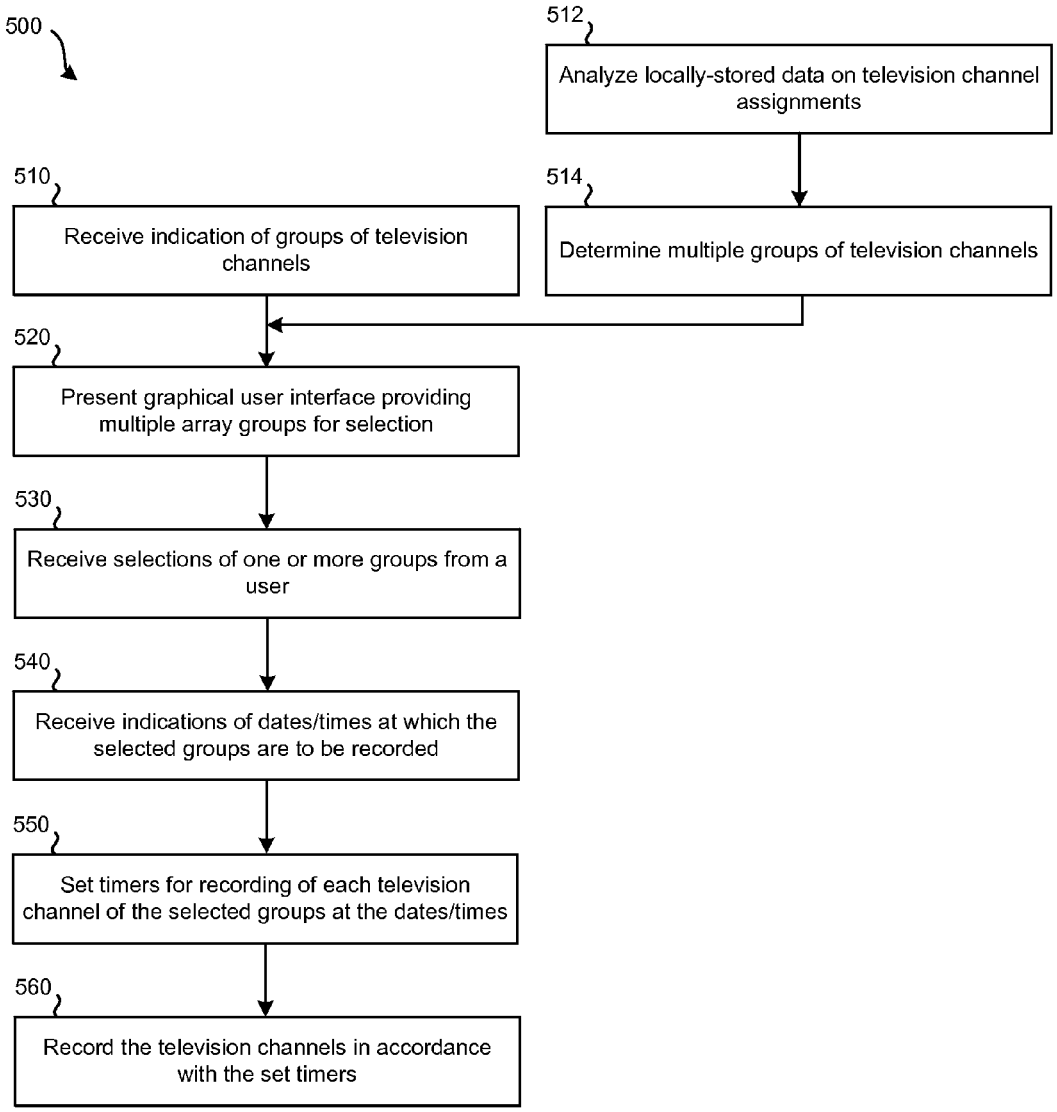
500
512
Analyze locally-stored data on television channel assignments
510
Receive indication of groups of television channels
514
Determine multiple groups of television channels
520
Present graphical user interface providing multiple array groups for selection
530
Receive selections of one or more groups from a user
540
Receive indications of dates/times at which the selected groups are to be recorded
550
Set timers for recording of each television channel of the selected groups at the dates/times
560
Record the television channels in accordance with the set timers

FIG. 5

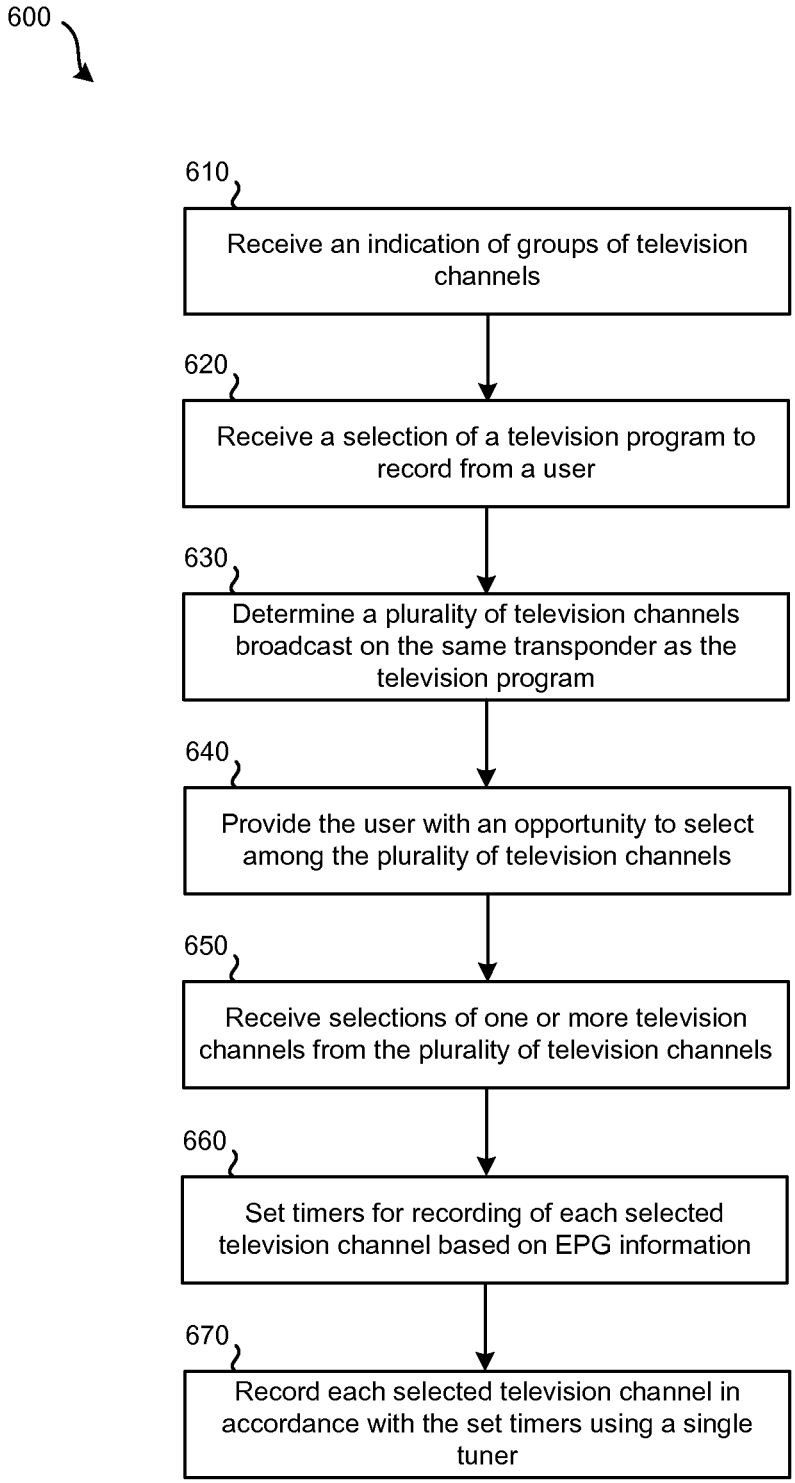
600
610
Receive an indication of groups of television channels
620
Receive a selection of a television program to record from a user
630
Determine a plurality of television channels broadcast on the same transponder as the television program
640
Provide the user with an opportunity to select among the plurality of television channels
650
Receive selections of one or more television channels from the plurality of television channels
660
Set timers for recording of each selected television channel based on EPG information
670
Record each selected television channel in accordance with the set timers using a single tuner

FIG. 6

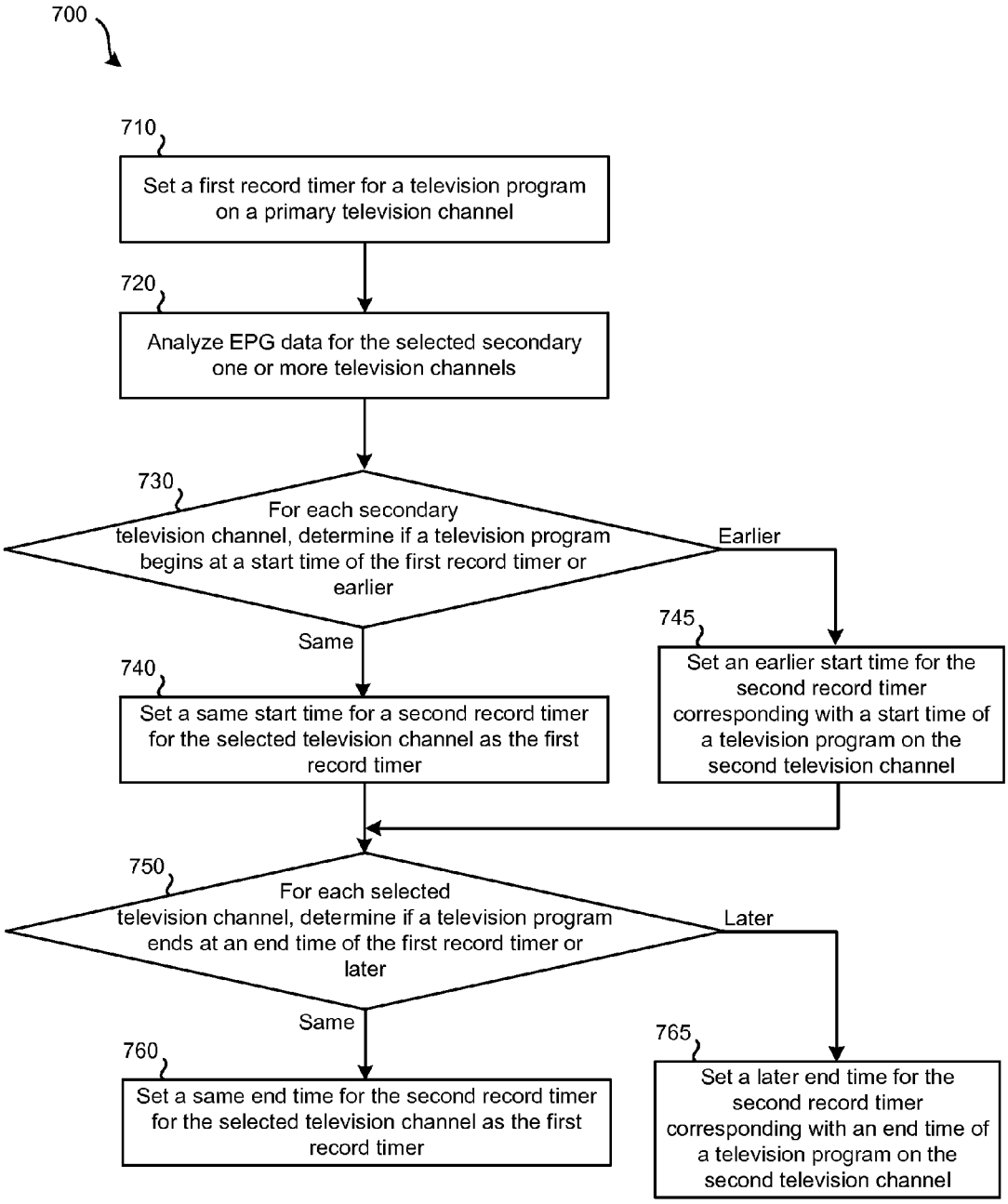
700
710
Set a first record timer for a television program on a primary television channel
720
Analyze EPG data for the selected secondary one or more television channels
730
For each secondary television channel, determine if a television program begins at a start time of the first record timer or earlier
Earlier
Same
745
Set an earlier start time for the second record timer corresponding with a start time of a television program on the second television channel
740
Set a same start time for a second record timer for the selected television channel as the first record timer
750
For each selected television channel, determine if a television program ends at an end time of the first record timer or later
Later
Same
765
Set a later end time for the second record timer corresponding with an end time of a television program on the second television channel
760
Set a same end time for the second record timer for the selected television channel as the first record timer

FIG. 7

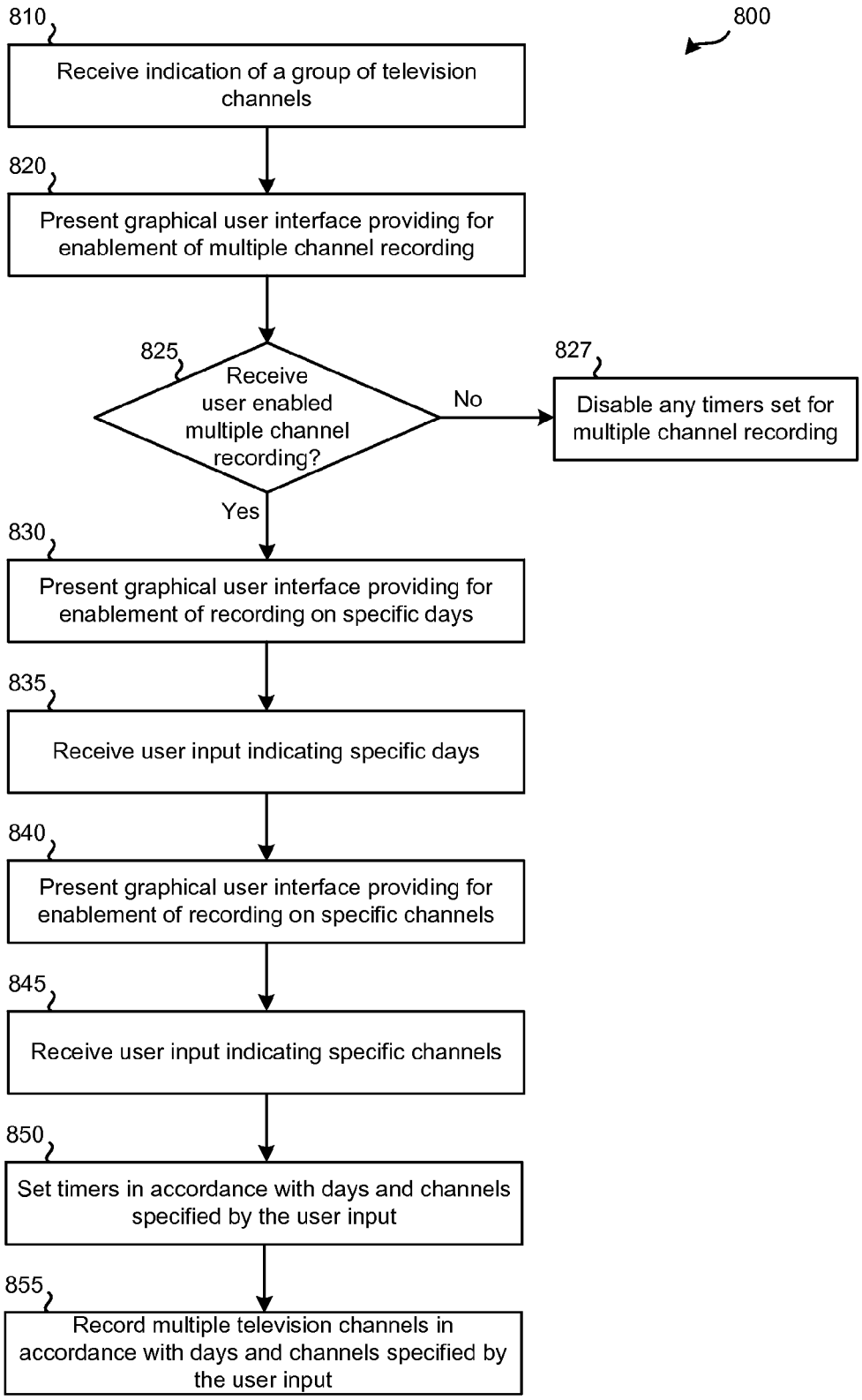
800
810
Receive indication of a group of television channels
820
Present graphical user interface providing for enablement of multiple channel recording
825
Receive user enabled multiple channel recording?
No
827
Disable any timers set for multiple channel recording
Yes
830
Present graphical user interface providing for enablement of recording on specific days
835
Receive user input indicating specific days
840
Present graphical user interface providing for enablement of recording on specific channels
845
Receive user input indicating specific channels
850
Set timers in accordance with days and channels specified by the user input
855
Record multiple television channels in accordance with days and channels specified by the user input

FIG. 8

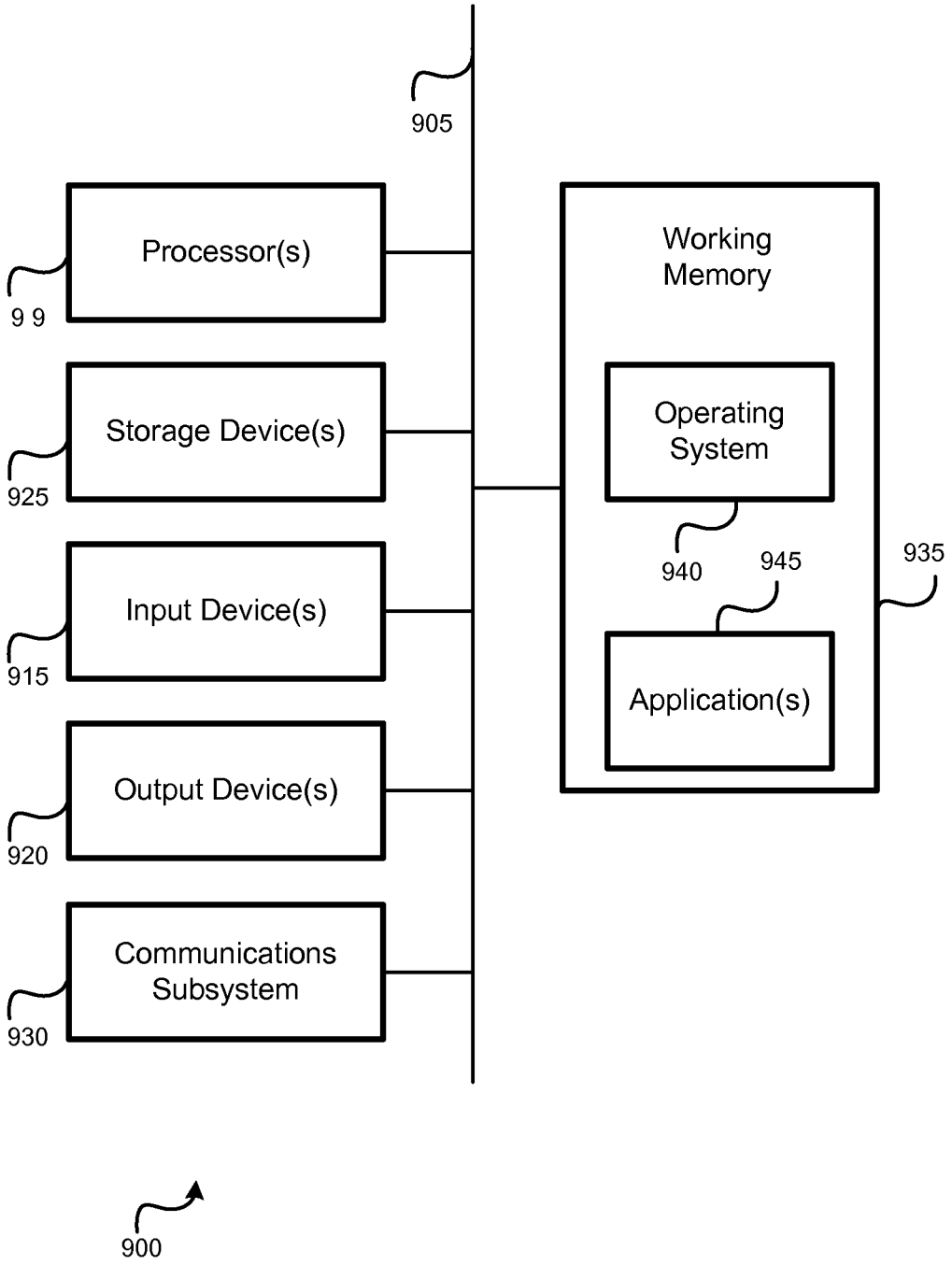
905
Processor(s)
9 9
Storage Device(s)
925
Input Device(s)
915
Output Device(s)
920
Communications Subsystem
930
Working Memory
Operating System
940
945
Application(s)
935
900

FIG. 9

RECORDING OF MULTIPLE TELEVISION CHANNELS

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims priority to co-pending U.S. provisional application 61/611,483, filed Mar. 15, 2012, entitled "Reception, Recording, Storage, and Manipulation of Multiple Television Channels", the entire disclosure of which is hereby incorporated by reference for all purposes.

BACKGROUND

The advent of the digital video recorder (DVR) and the availability of high-capacity computer-readable storage devices at reasonable prices have made available many possibilities to television programming service providers and television viewers alike. In recent years, television viewers have come to expect the ability to easily customize and manage the recording of television programming via their television receivers.

SUMMARY

In some embodiments, a television receiver configured to record television channels is presented. The television receiver may include a tuner and one or more processors. The television receiver may include a memory communicatively coupled with and readable by the one or more processors and having stored therein processor-readable instructions. When executed by the one or more processors, the instructions may cause the one or more processors to cause a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of multiple television channels. Each of the multiple television channels may be transmitted as part of a single transponder stream that is configured to be received by the tuner. The instructions may cause the one or more processors to receive a first user input, in response to the first user interface, wherein the first user input enables the option for recording of the multiple television channels. The instructions may cause the one or more processors to receive, from the television service provider, data indicating a time period during which a television channel of the multiple television channels is to be recorded. The instructions may cause the one or more processors to set a record timer for the television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the data indicating the time period. The instructions may cause the one or more processors to cause the television channel of the multiple television channels to be recorded based on the record timer.

Embodiments of such a television receiver may include one or more of the following: The processor-readable instructions may be further configured to cause the one or more processors to: cause a second user interface to be presented via the display device, the second user interface comprising options to enable recording of the multiple television channels on selected days of the week; and receive user input, in response to the second user interface, wherein the user input selects multiple days of the week. The processor-readable instructions configured to cause the one or more processors to set the record timer comprises processor-readable instructions configured to cause the one or more processors to set the record timer for the television channel of the multiple television channels based on the selected multiple days of the week, the user input enabling recording of multiple television channels, and the data indicating the time period. The processor-readable instructions may be further configured to cause the one or more processors to cause a third user interface to be presented via the display device, the third user interface comprising options to enable recording on only selected television channels of the multiple television channels; and receive user input, in response to the third user interface, wherein the user input selects a subset of television channels from the multiple television channels. Each of the multiple television channels may be transmitted to the television receiver using the single transponder stream.

Additionally or alternatively, embodiments of such a television receiver may include one or more of the following: The processor-readable instructions configured to cause the one or more processors to set the record timer may include processor-readable instructions configured to cause the one or more processors to: set the record timer for the television channel of the multiple television channels based on the selected subset of television channels, the selected days of the week, the user input enabling recording of multiple television channels, and the data indicating the time period received from the television service provider. The processor-readable instructions configured to cause the one or more processors to set the record timer may include processor-readable instructions configured to cause the one or more processors to: receive, from the television service provider, data indicating time periods for a day during which each television channel of the multiple television channels are to be recorded, wherein on the day each time period overlaps, thereby defining an overlapping time period; set record timers for each television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the time periods; and cause each television channel of the multiple television channels to be recorded based on the record timers, wherein each television channel of the multiple television channels is received by the television receiver using the tuner during the overlapping time period. The processor-readable instructions configured to cause the one or more processors to set the record timer may include processor-readable instructions configured to cause the one or more processors to, after setting the record timers for each television channel of the multiple television channels, receive a second user input disabling the option for recording of the multiple television channels; and in response to the second user input, disable timers for each television channel of the multiple television channels that were set based on the user input enabling recording of multiple television channels and the data indicating the time periods received from the television service provider. During the time period multiple television programs may be scheduled to be broadcast on the television channel.

In some embodiments, a method for recording television channels is presented. The method may include causing, by a television receiver, a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of the multiple television channels. Each of the multiple television channels may be transmitted as part of a single transponder stream that is configured to be received by a tuner of the television receiver. The method may include receiving, by the television receiver, a first user input, in response to the first user interface, wherein the first user input enables the option for recording of the multiple television channels. The method may include receiving, by the television receiver from the television service provider, data indicating a time period during which a television channel of the multiple television channels is to be

recorded. The method may include setting, by the television receiver, a record timer for the television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the data indicating the time period. The method may include recording, by the television receiver, the television channel of the multiple television channels based on the record timer.

Embodiments of such a method may include one or more of the following: The method may include causing, by the television receiver, a second user interface to be presented via the display device, the second user interface comprising options to enable recording of the multiple television channels on selected days of the week. The method may include receiving, by the television receiver, user input, in response to the second user interface, wherein the user input selects multiple days of the week. The method may include setting, by the television receiver, the record timer for the television channel of the multiple television channels based on the selected multiple days of the week, the user input enabling recording of multiple television channels, and the data indicating the time period. The method may include causing, by the television receiver, a third user interface to be presented via the display device, the third user interface comprising options to enable recording on only selected television channels of the multiple television channels.

Additionally or alternatively, embodiments of such a method may include one or more of the following: The method may include receiving, by the television receiver, user input, in response to the third user interface, wherein the user input selects a subset of television channels from the multiple television channels. Each of the multiple television channels may be transmitted to the television receiver using the single transponder stream. The method may include setting, by the television receiver, the record timer for the television channel of the multiple television channels based on the selected subset of television channels, the selected days of the week, the user input enabling recording of multiple television channels, and the data indicating the time period received from the television service provider. The method may include receiving, by the television receiver from the television service provider, data indicating time periods for a day during which each television channel of the multiple television channels are to be recorded, wherein on the day each time period overlaps, thereby defining an overlapping time period. The method may include setting, by the television receiver, record timers for each television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the time periods. The method may include recording, by the television receiver each television channel of the multiple television channels based on the record timers, wherein each television channel of the multiple television channels is received by the television receiver using the tuner during the overlapping time period. The method may include, after setting the record timers for each television channel of the multiple television channels, receiving, by the television receiver, a second user input disabling the option for recording of the multiple television channels. The method may include, in response to the second user input, disabling, by the television receiver, timers for each television channel of the multiple television channels that were set based on the user input enabling recording of multiple television channels and the data indicating the time periods received from the television service provider. During the time period multiple television programs may be scheduled to be broadcast on the television channel.

In some embodiments, a non-transitory processor-readable medium for recording television channels, comprising processor-readable instructions is presented. The instructions may be configured to cause one or more processors to cause a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of the multiple television channels. Each of the multiple television channels may be transmitted as part of a single transponder stream that is configured to be received by the tuner. The instructions may be configured to cause one or more processors to receive a first user input, in response to the first user interface, wherein the first user input enables the option for recording of the multiple television channels. The instructions may be configured to cause one or more processors to receive, from the television service provider, data indicating a time period during which a television channel of the multiple television channels is to be recorded. The instructions may be configured to cause one or more processors to set a record timer for the television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the data indicating the time period. The instructions may be configured to cause one or more processors to cause the television channel of the multiple television channels to be recorded based on the record timer.

Embodiments of such a non-transitory processor-readable medium may include one or more of the following: The instructions may be configured to cause one or more processors to cause a second user interface to be presented via the display device, the second user interface comprising options to enable recording of the multiple television channels on selected days of the week. The instructions may be configured to cause one or more processors to receive user input, in response to the second user interface, wherein the user input selects multiple days of the week. The processor-readable instructions configured to cause the one or more processors to set the record timer may include processor-readable instructions configured to cause the one or more processors to set the record timer for the television channel of the multiple television channels based on the selected multiple days of the week, the user input enabling recording of multiple television channels, and the data indicating the time period. During the time period multiple television programs may be scheduled to be broadcast on the television channel.

BRIEF DESCRIPTION OF THE DRAWINGS

A further understanding of the nature and advantages of various embodiments may be realized by reference to the following figures. In the appended figures, similar components or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

FIG. **1** illustrates an embodiment of a satellite television distribution system.

FIG. **2** illustrates an embodiment of a television receiver that is configured to record multiple television channels.

FIG. **3** illustrates an embodiment of on-screen television channel group selections for recording.

FIG. **4** illustrates an embodiment of on-screen secondary television channel selections for recording.

FIG. **4**B illustrates an embodiment of on-screen television channel selections for recording.

FIG. **5** illustrates an embodiment of a method for recording multiple television channels concurrently.

FIG. **6** illustrates another embodiment of a method for recording multiple television channels concurrently.

FIG. **7** illustrates an embodiment of a method for using electronic programming guide information to ensure entire television programs are recorded.

FIG. **8** illustrates an embodiment of a method for recording multiple television channels based on user input.

FIG. **9** illustrates an embodiment of a computer system.

DETAILED DESCRIPTION

Conventionally, when recording a television program on a television channel, a television receiver may use a tuner to receive a stream of data at a particular frequency that contains the television channel. Data associated with the television program may then be stored for playback via a display device at a later time. In such conventional arrangements, for each television channel that is recorded, a tuner of the television receiver may be used to receive the stream of data containing the television channel. As such, in a conventional arrangement, the number of television channels recorded concurrently by the television receiver may be greatly restricted. For example, if a television receiver has three tuners, only three different television channels may be recorded at the same time (and/or one or more of these three different television channels may be output for presentation to a display device, such as a television).

In contrast to such conventional arrangements, it may be possible to use a single tuner to receive multiple television channels for recording (and/or presentation) concurrently using a single tuner. Multiple television channels that are transmitted as part of the same data stream (which may be in the form of a transponder stream) may be received using a single tuner. As such, if multiple television channels that a user desires to record are transmitted as part of a same transponder stream, a single tuner of a television receiver may be used to receive the multiple television channels for recording. Therefore, fewer resources of the television receiver may need to be devoted to recording television programs if the television programs are transmitted as parts of the same transponder stream.

Which television channels are assigned to which transponder stream may be decided by the television service provider. As such, a user may have no obvious way of determining which television channels are transmitted as part of the same transponder stream (and thus can be received concurrently using a single tuner of the television receiver). Embodiments detailed herein provide a user with on-screen options for selecting television channels to record via a single tuner.

In some embodiments, a user is presented with an option to select among predefined television channel groups. Each group may contain television channels transmitted to the television receiver as part of a single transponder stream. As such, for each group of television channels to be recorded concurrently, only a single tuner of the television receiver may need to be used. For each group, the specific television channels and/or the date/times at which the television channels within the group are recorded may be defined by the television service provider. In some embodiments, a user may define the record date/times for each group of the television channels.

In some embodiments, a user may be permitted to use an electronic programming guide (EPG) to select a television program for recording. The television receiver may determine which other television channels are also available for recording using the same transponder. The user may then be presented with an on-screen selection indicating one or more other television channels which can be recorded concurrently using a single tuner. The record times of such other television channels may be adjusted such that recording on each of these other television channels begins at a start of a television program and ends at an end of a television program.

FIG. **1** illustrates an embodiment of a satellite television distribution system **100**. While embodiments detailed herein may be applied to various television distribution systems, including cable and IP, a satellite television distribution system is provided as an example. Satellite television distribution system **100** may include: television service provider system **110**, satellite transmitter equipment **120**, satellites **130**, satellite dish **140**, television receiver **150**, and television **160**. Alternate embodiments of satellite television distribution system **100** may include fewer or greater numbers of components. While only one satellite dish **140**, television receiver **150**, and television **160** (collectively referred to as "user equipment") are illustrated, it should be understood that multiple (e.g., tens, thousands, millions) instances of user equipment may receive television signals from satellites **130**.

Television service provider system **110** and satellite transmitter equipment **120** may be operated by a television service provider. A television service provider may distribute television channels, on-demand programming, programming information, and/or other services to users. Television service provider system **110** may receive feeds of one or more television channels from various sources. Such television channels may include multiple television channels that contain the same content (but may be in different formats, such as high-definition and standard-definition). To distribute such television channels to users, feeds of the television channels may be relayed to user equipment via one or more satellites via transponder streams. Satellite transmitter equipment **120** may be used to transmit a feed of one or more television channels from television service provider system **110** to one or more satellites **130**. While a single television service provider system **110** and satellite transmitter equipment **120** are illustrated as part of satellite television distribution system **100**, it should be understood that multiple instances of transmitter equipment may be used, possibly scattered geographically to communicate with satellites **130**. Such multiple instances of satellite transmitting equipment may communicate with the same or with different satellites. Different television channels may be transmitted to satellites **130** from different instances of transmitting equipment. For instance, a different satellite dish of satellite transmitter equipment **120** may be used for communication with satellites in different orbital slots.

Satellites **130** may be configured to receive signals, such as streams of television channels, from one or more satellite uplinks such as satellite transmitter equipment **120**. Satellites **130** may relay received signals from satellite transmitter equipment **120** (and/or other satellite transmitter equipment) to multiple instances of user equipment via transponder streams. Different frequencies may be used for uplink signals **170** from transponder stream **180**. Satellites **130** may be in geosynchronous orbit. Each satellite **130** may be in a different orbital slot, such that the signal paths between each satellite, transmitter equipment, and user equipment vary. Each satellite **130** may have multiple transponders operating at different transmit frequencies. Multiple satellites **130** may be used to relay television channels from television service provider system **110** to satellite dish **140**. Different television channels may be carried using different satellites and/or different transponders. Different television channels may also be carried using different transponders of the same satellite; thus, such

television channels may be transmitted at different frequencies and/or different frequency ranges. As an example, a first and second television channel may be carried on a first transponder of satellite **130-1** (and thus be part of a first transponder stream). A third, fourth, and fifth television channel may be carried using a different satellite or a different transponder of the same satellite relaying the transponder stream at a different frequency (and thus be part of a second transponder stream). A transponder stream transmitted by a particular transponder of a particular satellite may include a finite number of television channels, such as seven. Accordingly, if many television channels are to be made available for viewing and recording, multiple transponder streams may be necessary to transmit all of the television channels to the instances of user equipment.

Satellite dish **140** may be a piece of user equipment that is used to receive transponder streams from one or more satellites, such as satellites **130**. Satellite dish **140** may be provided to a user for use on a subscription basis to receive television channels provided by the television service provider system **110**, satellite transmitter equipment **120**, and/or satellites **130**. Satellite dish **140** may be configured to relay transponder streams from multiple satellites and/or multiple transponders of the same satellite to television receiver **150**. Based on the characteristics of television receiver **150** and/or satellite dish **140**, it may only be possible to capture transponder streams from a limited number of transponders concurrently. For example, a tuner of television receiver **150** may only be able to tune to a single transponder stream from a transponder of a single satellite at a time.

In communication with satellite dish **140** may be one or more sets of receiving equipment. Receiving equipment may be configured to decode signals received from satellites **130** via satellite dish **140** for display on a display device, such as television **160**. Receiving equipment may be incorporated as part of a television or may be part of a separate device, commonly referred to as a set-top box (STB). Receiving equipment may include a satellite tuner configured to receive television channels via a satellite. In FIG. **1**, receiving equipment is present in the form of television receiver **150**. As such, television receiver **150** may decode signals received via satellite dish **140** and provide an output to television **160**. FIG. **2** provides additional detail of a television receiver. A television receiver is defined to include set-top boxes (STBs) and also circuitry having similar functionality that may be incorporated with another device. For instance, circuitry similar to that of television receiver **150** may be incorporated into a television. As such, while FIG. **1** illustrates an embodiment of television receiver **150** as separate from television **160**, it should be understood that in other embodiments, similar functionality may be present in a television receiver integrated with television **160**.

Television **160** may be used to present video and/or audio decoded by television receiver **150**. Television receiver **150** may also output a display of one or more interfaces to television **160**, such as an electronic programming guide (EPG). In some embodiments, a display device other than a television may be used.

Uplink signal **170-1** represents a signal between satellite transmitter equipment **120** and satellite **130-1**. Uplink signal **170-2** represents a signal between satellite transmitter equipment **120** and satellite **130-2**. Each of uplink signals **170** may contain streams of one or more different television channels. For example, uplink signal **170-1** may contain a certain group of television channels, while uplink signal **170-2** contains a different grouping of television channels. Each of these television channels may be scrambled such that unauthorized persons are prevented from accessing the television channels.

Transponder stream **180-1** represents a signal between satellite **130-1** and satellite dish **140**. Transponder stream **180-2** represents a signal between satellite **130-2** and satellite dish **140**. Each of transponder streams **180** may contain one or more different television channels in the form of transponder streams, which may be at least partially scrambled. For example, transponder stream **180-1** may include a first transponder stream containing a first group of television channels, while transponder stream **180-2** may include a second transponder stream containing a different group of television channels. A satellite may transmit multiple transponder streams to user equipment. For example, a typical satellite may relay thirty-two transponder streams via thirty-two transponders to user equipment. Further, spot beams are possible. For example, a satellite may be able to transmit a transponder stream to a particular geographic region (e.g., to distribute local television channels to the relevant market). Different television channels may be transmitted using the same frequency of the transponder stream to a different geographic region.

FIG. **1** illustrates transponder stream **180-1** and transponder stream **180-2** being received by satellite dish **140**. For a first group of television channels, satellite dish **140** may receive a transponder stream of transponder stream **180-1**; for a second group of channels, a transponder stream of transponder stream **180-2** may be received. Television receiver **150** may decode the received transponder stream. As such, depending on which television channel(s) are desired, a transponder stream from a different satellite (or a different transponder of the same satellite) may be accessed and decoded by television receiver **150**. Further, while two satellites are present in satellite television distribution system **100**, in other embodiments greater or fewer numbers of satellites may be present for receiving and transmitting transponder streams to user equipment.

Network **190** may serve as a secondary communication channel between television service provider system **110** and television receiver **150**. Via such a secondary communication channel, bidirectional exchange of data may occur. As such, data may be transmitted to television service provider system **110** via network **190**. Data may also be transmitted from television service provider system **110** to television receiver **150** via network **190**. Network **190** may be the Internet. While audio and video services may be provided to television receiver **150** via satellites **130**, feedback from television receiver **150** to television service provider system **110** may be transmitted via network **190**.

FIG. **1** illustrates an example of a satellite-based television channel distribution system. It should be understood that at least some of the aspects of such a system may be similar to a cable television distribution system. For example, in a cable television system, rather than using satellite transponders, multiple RF channels on a cable may be used to transmit streams of television channels. As such, aspects detailed herein may be applicable to cable television distribution systems.

FIG. **2** illustrates an embodiment of television receiver **200**, which may typically be in the form of a separate device configured to be connected with a presentation device, such as a television. Embodiments of television receiver **200** may include set top boxes (STBs). As previously noted, in addition to being in the form of an STB, a television receiver may be incorporated into another device, such as a television. For example, a television may have an integrated television receiver (which does not involve an external STB being

coupled with the television). An STB may contain some or all of the components of television receiver **200** and/or may be able to perform some or all of the functions of television receiver **200**. Accordingly, instances in this document referring to an STB and steps being performed by an STB may also be performed, more generally, by a television receiver.

FIG. **2** illustrates a block diagram of an embodiment of television receiver **200** that is configured to record omnibus channel files and extract a television program from a recorded omnibus channel file. Television receiver **200** may be television receiver of FIG. **1** and may be in the form of an STB that communicates with a display device such as a television. Television receiver **200** may be incorporated as part of a television, such as television **160** of FIG. **1**. Television receiver **200** may include: processors **210** (which may include control processor **210-1** and tuning management processor **210-2**), tuners **215**, network interface **220**, non-transitory computer-readable storage medium **225**, electronic programming guide (EPG) database **230**, television interface **235**, networking information table (NIT) **240**, group database **244**, digital video recorder (DVR) database **245**, user interface **250**, PID filters **255**, smart card **260**, and/or descrambling engine **265**. In other embodiments of television receiver **200**, fewer or greater numbers of components may be present. It should be understood that the various components of television receiver **200** may be implemented using hardware, firmware, software, and/or some combination thereof. Functionality of components may be combined; for example, functions of descrambling engine **265** may be performed by tuning management processor **210-2**. Further, functionality of components may be spread among additional components; for example, PID filters **255** may be handled by separate hardware from program management table **257**.

Processors **210** may include one or more specialized and/or general-purpose processors configured to perform processes such as tuning to a particular channel, accessing and causing EPG information from EPG database **230** to be displayed, and/or receiving and processing input from a user. For example, processors **210** may include one or more processors dedicated to decoding video signals from a particular format, such as MPEG, for output and display on a television and for performing decryption. It should be understood that the functions performed by various modules of FIG. **2** may be performed using one or more processors. As such, for example, functions of descrambling engine **265** may be performed by control processor **210-1**.

Control processor **210-1** may communicate with tuning management processor **210-2**. Control processor **210-1** may control the recording of television channels based on timers stored in DVR database **245**. Control processor **210-1** may initiate recording of a television channel by sending a record command along with an indication of the television channel to be recorded to tuning management processor **210-2**. Control processor **210-1** may not send a second record command (if additional recording is to begin at the same time) until an acknowledgement that recording of the first television channel has successfully been received and initiated by tuning management processor **210-2**. Control processor **210-1** may also provide commands to tuning management processor **210-2** when recording of a television channel is to cease. In addition to providing commands relating to the recording of television channels, control processor **210-1** may provide commands to tuning management processor **210-2** that indicate television channels to be output to audio/video decoder **233** for output to a presentation device, such as a television.

Control processor **210-1** may also communicate with network interface **220** and user interface **250**. Control processor **210-1** may handle incoming data from network interface **220** and user interface **250**. Additionally, control processor **210-1** may be configured to output data via network interface **220**.

Tuners **215** may include one or more tuners used to tune to television channels, such as television channels transmitted via satellite or cable. In the illustrated embodiment of television receiver **200**, three tuners are present (tuner **215-1**, tuner **215-2**, and tuner **215-3**). Each tuner contained in tuners **215** may be capable of receiving and processing a single stream of data from a satellite transponder (or a cable RF channel) at a given time. As such, a single tuner may tune to a single transponder (or, for a cable network, a single cable RF channel). If tuners **215** include multiple tuners, one tuner may be used to tune to a television channel on a first transponder stream for display using a television, while another tuner may be used to tune to a television channel on a second transponder for recording and viewing at some other time. Still another tuner may be used to check various television channels to determine if they are available or not. If multiple television channels transmitted on the same transponder stream are desired, a single tuner of tuners **215** may be used to receive the signal containing the multiple television channels for presentation and/or recording. Tuners **215** may receive commands from tuning management processor **210-2**. Such commands may instruct tuners **215** which frequencies are to be used for tuning. Tuning management processor **210-2** may access network information table **240** and/or program management table **257** to determine a correct transponder stream (a correct satellite and transponder) to which to tune to receive a desired television channel.

Network interface **220** may be used to communicate via an alternate communication channel with a television service provider. For example, the primary communication channel may be via satellite (which may be unidirectional to the STB) and the alternate communication channel (which may be bidirectional) may be via a network, such as the Internet. Referring back to FIG. **1**, television receiver **150** may be able to communicate with television service provider system **110** via a network, such as the Internet. This communication may be bidirectional: data may be transmitted from television receiver **150** to television service provider system **110** and from television service provider system **110** to television receiver **150**. Referring back to FIG. **2**, network interface **220** may be configured to communicate via one or more networks, such as the Internet, to communicate with television service provider system **110** of FIG. **1**. Information may be transmitted and/or received via network interface **220**.

Storage medium **225** may represent a non-transitory computer-readable storage medium. Storage medium **225** may include memory and/or a hard drive. Storage medium **225** may be used to store information received from one or more satellites and/or information received via network interface **220**. Storage medium **225** may store information related to EPG database **230**, NIT **240** (rather than being stored locally by tuning management processor **210-2**), and/or DVR database **245**. Recorded television programs may be stored using storage medium **225**.

EPG database **230** may store information related to television channels and the timing of programs appearing on such television channels. EPG database **230** may be stored using storage medium **225**, which may be a hard drive. Information from EPG database **230** may be used to inform users of what television channels or programs are popular and/or provide recommendations to the user. Information from EPG database **230** may provide the user with a visual interface displayed by a television (or other form of display device) that allows a user to browse and select television channels and/or

television programs for viewing and/or recording. Information used to populate EPG database **230** may be received via network interface **220** and/or via satellites, such as satellites **130** of FIG. **1** via tuners **215**. For instance, updates to EPG database **230** may be received periodically via satellite. Data from EPG database **230** may be used to present an interface for a user to control DVR functions of television receiver **200**, and/or to enable viewing and/or recording of multiple television channels simultaneously.

In addition to being used to provide users with information about scheduled programming, information from EPG database **230** may be used to determine when television programs begin and end for the purposes of recording. For instance, if a channel-specific file is recorded that contains multiple television programs, the start and end of time of specific television programs within the channel-specific file may be based on the start and end times indicated in the EPG. Other data may be stored for the EPG that may be useful in managing channel-specific files, such as series identifiers and episode identifiers (which may be used by a television service provider to identify particular television programs).

Audio/video decoder **233** may serve to convert encoded video and audio into a format suitable for output to a display device. For instance, audio/video decoder **233** may receive MPEG video and audio from storage medium **225** or descrambling engine **265** to be output to a television. MPEG video and audio from storage medium **224** may have been recorded to DVR database **245** as part of a previously-recorded television program. Audio/video decoder **233** may convert the MPEG video and audio into a format appropriate to be displayed by a television or other form of display device and audio into a format appropriate to be output from speakers, respectively.

Television interface **235** may serve to output a signal to a television (or another form of display device) in a proper format for display of video and playback of audio. As such, television interface **235** may output one or more television channels and stored television programming from storage medium **225** (e.g., television programs from DVR database **245** and/or information from EPG database **230**) to a television for presentation.

The Network Information Table (NIT) **240** may store information used by television receiver **200** to access various television channels. NIT **240** may be stored locally by a processor, such as by tuning management processor **210-2**. Information used to populate NIT **240** may be received via satellite (or cable) through tuners **215** and/or may be received via network interface **220** from the television service provider. As such, information present in NIT **240** may be periodically updated. In some embodiments, NIT **240** may be locally-stored by television receiver **200** using storage medium **225**. Generally, NIT **240** may store information about a service provider network, such as a satellite-based service provider network. Information that may be present in NIT **240** may include: television channel numbers, satellite identifiers, frequency identifiers and/or transponder identifiers for various television channels. In some embodiments, NIT **240** may contain additional data or additional tables may be stored by the television receiver. For example, specific audio PIDs and video PIDs may not be present in NIT **240**, a channel identifier may be present within NIT **240** which may be used to look up the audio PIDs and video PIDs in another table, such as a program map table (PMT). In some embodiments, a PID associated with the data for the PMT is indicated in a separate table, program association table (PAT), which is not illustrated in FIG. **2**. A PAT may be stored by the television receiver in a similar manner to the NIT. For example, a PMT may store information on audio PIDs, video PIDs, and/or ECM (entitlement control message) PIDs for television channels that are transmitted on a transponder frequency.

Table 1 provides a simplified example of NIT **240** for several television channels. It should be understood that in other embodiments, many more television channels may be represented in NIT **240**. NIT **240** may be periodically updated by a television service provider. As such, television channels may be reassigned to different satellites and/or transponders, and television receiver **200** may be able to handle this reassignment as long as NIT **240** is updated.

TABLE 1

Channel	Satellite	Transponder
4	1	2
5	2	11
7	2	3
13	2	4

Based on information in the NIT, it may be possible to determine the proper satellite and transponder to which to tune for a particular television channel. In some embodiments, the NIT may list a particular frequency to which to tune for a particular television channel. Once tuned to the proper satellite/transponder/frequency, a known PMT PID may be used to retrieve a program map table that indicates the PIDs for audio and video streams of television channels transmitted by that transponder.

It should be understood that the values provided in Table 1 are for example purposes only. Actual values, including how satellites and transponders are identified, may vary. Additional information may also be stored in NIT **240**. Additional information on how NIT **240**, as indicated in Table 1, may be used is provided in reference to FIG. **3**. The same PID may be reused on different transponders.

A Digital Video Recorder (DVR) device may permit a television channel to be recorded for a period of time. DVR functionality of television receiver **200** may be managed by control processor **210-1**. Control processor **210-1** may coordinate the television channel, start time, and stop time of when recording of a television channel is to occur. DVR database **245** may store information related to the recording of television stations. DVR database **245** may store timers that are used by control processor **210-1** to determine when a television channel should be tuned to and recorded to DVR database **245** of storage medium **225**. In some embodiments, a limited amount of storage medium **225** may be devoted to DVR database **245**. Timers may be set by the television service provider and/or one or more users of television receiver **200**.

The DVR functionality of control processor **210-1** may have multiple modes. First, the DVR functionality of control processor **210-1** may be configured to record individual television programs selected by a user to DVR database **245**. Using EPG database **230**, a user may select a particular television program. Based on the date, time period, and television channel indicated by EPG database **230**, Control processor **210-1** may record the associated television program to DVR database **245**. Second, DVR database **245** may be used to store recordings of predefined periods of time on one or more television channels defined by a television service provider. These predefined periods of time may include one or more television programs. For example, primetime programming on a particular television network may be recorded each weekday night. Further, multiple television channels may be recorded for such predefined periods of time. Such recording

of television channels for predefined periods of time may be defined by the television service provider.

As an example of this second mode of DVR functionality, a television service provider may configure television receiver **200** to record television programming on multiple, predefined television channels for a predefined period of time, on predefined dates. For instance, a television service provider may configure television receiver **200** such that television programming may be recorded from 7 to 10 PM on NBC, ABC, CBS, and FOX on each weeknight. If a television program is selected for recording by a user and is also specified for recording by the television service provider, the user selection may serve as an indication to save the television program for an extended time (beyond the time which the predefined recording would otherwise be saved).

Further, DVR functionality may include control processor **210-1**, or some other processing device of television receive **200**, determining multiple television channels that can be recorded simultaneously using a single tuner to receive the multiple television channels. For example, a user may select a particular television program that is to be broadcast on a particular television channel for recording. Based on the television channel selected, control processor **210-1** may access a database, such as group database **244**, to determine one or more additional television channels that are transmitted as part of the same transponder stream. In some embodiments, rather than consulting group database **244** to determine which television channels can be received concurrently using a single tuner, control processor **210-1** may examine NIT **240** (or some other data storage arrangement) to identify other television channels associated with the same frequency and/or satellite and transponder.

Group database **244** may store data indicating groups of television channels transmitted using a same transponder stream. As such, each group identified within group database **244** may be received concurrently using a single tuner. The groupings of television channels stored by group database **244** may be transmitted to television receiver **200** by the television service provider. In some embodiments, by analyzing NIT **240** and/or PMT **257**, control processor **210-1** may identify the groupings of television channels and store them to group database **244**. In some embodiments, rather than constructing group database **244**, control processor **210-1** (or some other processing device) may analyze data present in NIT **240**, PMT **257**, and/or some other data storage arrangement to determine television channels transmitted as part of a same transponder stream.

User interface **250** may include a remote control (physically separate from television receiver **200**) and/or one or more buttons on television receiver **200** that allow a user to interact with television receiver **200**. User interface **250** may be used to select a television channel for viewing, view information from EPG database **230**, and/or program a timer stored to DVR database **245**, wherein the timer is used to control the DVR functionality of control processor **210-1**.

Referring back to tuners **215**, television channels received via satellite (or cable) may contain at least some scrambled data. Packets of audio and video may be scrambled to prevent unauthorized users (e.g., nonsubscribers) from receiving television programming without paying the television service provider. When a tuner of tuners **215** is receiving data from a particular transponder of a satellite, the transponder stream may be a series of data packets corresponding to multiple television channels. Each data packet may contain a packet identifier (PID), which, in combination with NIT **240** and/or PMT **257**, can be determined to be associated with a particular television channel. Particular data packets, referred to as entitlement control messages (ECMs), may be periodically transmitted. ECMs may be associated with another PID and may be encrypted; television receiver **200** may use smart card **260** to decrypt ECMs. Decryption of an ECM may only be possible if the user has authorization to access the particular television channel associated with the ECM. When an ECM is determined to correspond to a television channel being stored and/or displayed, the ECM may be provided to smart card **260** for decryption.

When smart card **260** receives an encrypted ECM, smart card **260** may decrypt the ECM to obtain some number of control words. In some embodiments, from each ECM received by smart card **260**, two control words are obtained. In some embodiments, when smart card **260** receives an ECM, it compares the ECM to the previously received ECM. If the two ECMs match, the second ECM is not decrypted because the same control words would be obtained. In other embodiments, each ECM received by smart card **260** is decrypted; however, if a second ECM matches a first ECM, the outputted control words will match; thus, effectively, the second ECM does not affect the control words output by smart card **260**. Smart card **260** may be permanently part of television receiver **200** or may be configured to be inserted and removed from television receiver **200**.

Tuning management processor **210-2** may be in communication with tuners **215** and control processor **210-1**. Tuning management processor **210-2** may be configured to receive commands from control processor **210-1**. Such commands may indicate when to start/stop recording of a television channel and/or when to start/stop causing a television channel to be output to a television. Tuning management processor **210-2** may control tuners **215**. Tuning management processor **210-2** may provide commands to tuners **215** that instruct the tuners which satellite, transponder, and/or frequency to which to tune. From tuners **215**, tuning management processor **210-2** may receive transponder streams of packetized data. As previously detailed, some or all of these packets may include a PID that identifies the content of the packet.

Tuning management processor **210-2** may be configured to create one or more PID filters **255** that sort packets received from tuners **215** based on the PIDs. When a tuner is initially tuned to a particular frequency (e.g., to a particular transponder of a satellite) a PID filter may be created based on a PID of PMT data. The PID of PMT data packets may be known because it is stored as part of NIT **240** or another table, such as a PAT. From the PMT data packets, PMT may be constructed by tuning management processor **210-2**. Table 2 provides an exemplary extract of a PMT. PMT **257** may be specific to a particular transponder. As such, if tuning to a different transponder occurs, a new PMT may be created for the different transponder.

TABLE 2

Channel	Video PID	1st Audio PID	2nd Audio PID
4	1003	2383	2119
5	2993	2727	2728
7	9238	1233	0129
13	0012	9348	—

Accordingly, based on the information present in PMT **257**, the audio and video PIDs for specific television channels may be identified. A television channel may have multiple audio PIDs due to a second audio program (SAP), which may be in a different language.

It should be understood that the values provided in Table 2 are for example purposes only. Actual values may vary. Additional information or less information may also be stored in PMT **257**.

PID filters **255** may be configured to filter data packets based on PIDs. In some embodiments, PID filters **255** are created and executed by tuning management processor **210-2**. In other embodiments, separate hardware may be used to create and execute such PID filters. Depending on a television channel selected for recording/viewing, a PID filter may be created to filter the video and audio packets associated with the television channel (based on the PID assignments present in PMT **257**). For example, if a transponder data stream includes multiple television channels, data packets corresponding to a television channel that is not desired to be stored or displayed by the user, may be ignored by PID filters **255**. As such, only data packets corresponding to the one or more television channels desired to be stored and/or displayed may be filtered and passed to either descrambling engine **265** or smart card **260**; other data packets may be ignored. For each television channel, a stream of video packets, a stream of audio packets (one or both of the audio programs) and/or a stream of ECM packets may be present, each stream identified by a PID. In some embodiments, a common ECM stream may be used for multiple television channels. Additional data packets corresponding to other information, such as updates to NIT **240**, may be appropriately routed by PID filters **255**. At a given time, one or multiple PID filters may be executed by tuning management processor **210-2**.

Descrambling engine **265** may use the control words output by smart card **260** in order to descramble video and/or audio corresponding to television channels for storage and/or presentation. Video and/or audio data contained in the transponder data stream received by tuners **215** may be scrambled. Video and/or audio data may be descrambled by descrambling engine **265** using a particular control word. Which control word output by smart card **260** to be used for successful descrambling may be indicated by a scramble control identifier present within the data packet containing the scrambled video or audio. Descrambled video and/or audio may be output by descrambling engine **265** to storage medium **225** for storage (in DVR database **245**) and/or to audio/video decoder **233** for output to a television or other presentation equipment via television interface **235**.

For simplicity, television receiver **200** of FIG. **2** has been reduced to a block diagram; commonly known parts, such as a power supply, have been omitted. Further, some routing between the various modules of television receiver **200** has been illustrated. Such illustrations are for exemplary purposes only. The state of two modules not being directly or indirectly connected does not indicate the modules cannot communicate. Rather, connections between modules of the television receiver **200** are intended only to indicate possible common data routing. It should be understood that the modules of television receiver **200** may be combined into a fewer number of modules or divided into a greater number of modules. Further, the components of television receiver **200** may be part of another device, such as built into a television. Also, while television receiver **200** may be used to receive, store, and present television channels received via a satellite, it should be understood that similar components may be used to receive, store, and present television channels via a cable network.

FIG. **3** illustrates an embodiment **300** of an on-screen interface for making television channel group selections. In embodiment **300**, television **310** is displaying an on-screen user interface **305** that allows for selection among multiple television channel groupings. Such an on-screen user interface **305** may be generated by a television receiver and output to a display device, such as television **310**, for display. Television receiver **200** of FIG. **2** or some other television receiver may be used to generate on-screen user interface **305**.

Each individual group of television channels in the illustrated embodiment is transmitted using a single transponder stream. As such, a particular group of television channels may be concurrently received using a single tuner of the television receiver. For example, group **320-1** contains four television channels. These four television channels may be received concurrently using a single tuner of a television receiver. Therefore, the television receiver may be able to record some or all of the television channels within group **320-1** concurrently.

In illustrated embodiment **300**, television channels are assigned to transponder streams based on content categories. Therefore, a first transponder stream may carry mostly or exclusively a particular category of television channels, while a second transponder stream may carry a different category of television programming. As such, groups for recording may be defined based on content categories. This may be useful to a user because a user likely to record a sports television channel may also be likely to desire concurrent recording of another sports-related television channel. Further, assignment to particular groups (and corresponding transponder streams) may vary based on television programming currently being shown on a television channel. For example, a particular television channel may show football on Sunday afternoons, but may broadcast drama on a weekday night.

In some embodiments, each group corresponds to a particular category of content, such as music for group **320-2**. However, it should be understood that other grouping methodologies may be used: groupings may be random, based on channel number, alphabetically, based on anticipated or past popularity, based on user voting, based upon previous data that indicates if a first channel is being recorded which other television channels are also likely to be recorded. It should be understood that still other methodologies may also be used.

In illustrated embodiment **300**, the user has selected three groups for recording: group **320-1**, group **320-5**, and group **320-4**. Other available groups, such as group **320-3**, have not been selected by a user. Each group may require a single tuner to receive and record (and/or present) each television channel within the group concurrently. It should be understood, in some embodiments, a group may require two or more tuners to receive and record (and/or present) each television channel within the group concurrently. It should also be understood that it may be possible for multiple groups to be received by the television receiver as parts of the same transponder stream. For example, each television channel of group **320-1** and group **320-2** may be transmitted as part of the same transponder stream. Accordingly, in such an embodiment, only a single tuner may be required to receive every television channel in group **320-1** and group **320-2**.

A user may use a graphical element, such as checkboxes **330**, or some other form of indicator to select one or more groups which the user desires to record. In some embodiments, a user may be able to specify particular television channels within the group that the user desires or does not desire to record. For example, referring to group **320-1**, checkbox **330-1** has been checked, thus indicating that the user desires to record all four channels within group **320-1**. Checkbox **330-2** is unchecked, indicating the user does not desire the television channels of group **320-2** to be recorded. In other embodiments, a user may be able to select individual

television channels within group **320-1** that the user desires to record. By each of these television channels being present within group **320-1**, the user may be aware that each of these television channels only requires a single tuner for the television channels to be recorded concurrently (thus allowing other tuners to be assigned to receiving other television channels that are transmitted as part of other transponder streams for either recording and/or presentation).

The dates and/or times for the recording of groups of television channels and/or specific television channels within a group may be either user-defined or television service provider-defined. In some embodiments, if a group of television channels is selected, such as group **320-1**, the television service provider may define when those particular television channels are recorded. For example, each television channel within a particular group may be recorded during primetime viewing hours, such as from 7 until 10 PM, on a nightly basis. Accordingly, the data that indicates when particular television channels are to be recorded may be transmitted by the television service provider to the television receiver. Thus, the dates and/or times for which a particular group of television channels are recorded may vary according to the dates and/or times selected by the television service provider.

Dates and/or times selected for recording of particular groups may vary based on when programming on the channels within the group is likely to be desired by a user (as decided by an agent at the television service provider). As an example of this, group **320-5** contains television networks that tend to broadcast new television programs during primetime on weekdays between 7 PM and 10 PM. As such, if the user selects group **320-5** for recording and the television service provider is to select the dates and times for recording, group **320-5** may be recorded on weekdays between 7 PM and 10 PM. In contrast, group **320-4** may tend to show television programming desired to be recorded on weekend mornings. As such, the television service provider may provide data to the television receiver such that group **320-4** is recorded only on weekend mornings. Such arrangements may free the user from having to select when groups **320** are to be recorded.

In some embodiments, the user may be able to define when individual groups of television channels are to be recorded. For example, a user may select a group, such as group **320-1**, for recording and also specify dates and/or times for which that group of television channels is to be recorded. The user may be permitted to specify a day of the week (e.g., any selection of days, Sunday through Saturday) and periods of time during the selected days of the week for which the television channels are to be recorded. The user may be permitted to specify different dates and/or times for particular television channels within the group and/or different dates and/or times for different groups. In some embodiments, a user is permitted to select as to whether dates and/or times for recording are defined by the television service provider or by the user.

Selection element **340** may permit a user to specify whether or not the user is to define record times. If "no" is selected, times provided by the television service provider may be used for recording. If "yes" is selected, the user may be prompted for recording dates and/or times. When a user has selected "yes," the default values may be dates/times defined by the television service provider.

The illustrated embodiment **300** of FIG. **3** shows one particular arrangement of how various groups may be presented for selection by a user via a display device by a television receiver. The layout, number of groups, groupings of television channels, and/or graphical elements may vary by embodiment. As such, in other embodiments the presentation of on-screen user interface **305** may vary in content, style, and/or layout.

FIG. **4** illustrates an embodiment **400** of on-screen secondary television channel selections. In embodiment **400**, television **310** is displaying an on-screen user interface **405** that allows for selection of a specific television channel for recording. Such an on-screen user interface **405** may be generated by a television receiver and output to a display device, such as television **310**, for display. Television receiver **200** of FIG. **2** or some other television receiver may be used to generate on-screen user interface **405**.

In the illustrated embodiment **400**, a user is using an EPG to select a television program for recording. In the illustrated embodiment, the user has selected television program **410** for recording. This television program appears on a television channel "OO." At least partially based on the selection of the television program and the television channel, a timer may be created and set at the television receiver such that recording of television channel "OO" begins at 7:30 PM and ends at 10:00 PM, such that the entirety of television program **410** is recorded. The television channel associated with the selected television channel may be referred to as the primary television channel.

In response to the selection of television program **410**, on-screen user interface **415** may be caused to be displayed. On-screen user interface **415** permits a user to select one or more secondary television channels for recording during a period of time overlapping the broadcast of television program **410**. Each of the secondary television channels from which the user is permitted to select may be transmitted to the television receiver using the same transponder stream as television program **410** (and thus primary television channel "OO"). A secondary television channel refers to a television channel selected for recording on a same transponder stream as the primary channel.

In the illustrated embodiment **400**, the user is permitted to select among three television channels also transmitted to the television receiver via the same transponder stream as primary television channel "OO." The user may be permitted to select one or more of these secondary television channels for recording. Each of these secondary television channels selected via user interface **420** may be received using the same tuner used to receive the primary television channel and television program **410**. As such, an additional tuner may not be necessary to record any of the secondary television channels presented in user interface **420** broadcast during the same time period as the primary television channel is being recorded for television program **410**. In some embodiments, rather than listing television channels for selection, television programs appearing on those television channels may be listed for selection. As an example, rather than listing "ETV," a user selection may present to the user for selection whether "Movie: Matches Set the Flame" should be recorded. This movie appears during an overlapping time period on "ETV" as when television program **410** is broadcast on television channel "OO." Additional television programs overlapping the broadcast time of television program **410** may also be listed.

A user may also be permitted via user interface **430** to indicate whether full television programs are to be recorded. Selection of such an option may prevent only portions of television programs from being recorded via secondary recording selections. For example, television program **410**, which was selected for recording by the user, is broadcast from 7:30 PM until 10 PM. Television channel WCVV is also transmitted using the same transponder and is available for

selection as a secondary recording by the user. However, during an overlapping period of time as when "00" is broadcasting television program **410**, WCVV is broadcasting television program **412** from 7 PM until 9 PM. As such, if WCVV is only recorded during the time period of television program **410**, 30 minutes at the beginning of television program **412** may be omitted from recording. By analyzing locally stored EPG information, the television receiver may modify start and stop times of recordings of secondary television channels selected via user interface **420** such that only full television programs are recorded. Accordingly, for example, if WCVV is to be recorded, recording may begin at 7 PM (using the single tuner). In some embodiments, rather than starting recording early, recording may be started late and thus only television programs **414** and **416** on WCVV may be recorded. Similar adjustments may be made to the end time of recording on a secondary television channel; recording of a secondary television channel may run beyond the end time for recording the primary television channel selected by the user for recording or may cease sooner. If the user indicates that full programs are not be recorded, such as via user interface **430**, recording on secondary television channels selected via user interface **420** may occur only during the time period during which the primary selected television program is to be recorded (thus possibly resulting in portions of television programs on the secondary television channels being omitted from recording).

The illustrated embodiment **400** of FIG. **4** shows one particular arrangement of how various groups may be presented for selection by a user via a display device by a television receiver. The layout, number of groups, groupings of television channels, and/or graphical elements may vary by embodiment. As such, in other embodiments the presentation of on-screen user interfaces **405** and **415** may vary in content, style, and/or layout.

FIG. **4**B illustrates an embodiment **400**B of on-screen television channel selections. In embodiment **400**B, a user may be permitted to enable or disable recording of multiple television channels that are transmitted to a television receiver as part of a single transponder stream. A single selection by a user, such as via user interface **455**, may permit a user to enable or disable recording of multiple television channels that are transmitted as part of a single transponder stream. Enablement of such multi-channel recording may involve each of the multiple television channels being received over overlapping periods of time using a single tuner of the television receiver for receiving the multiple television channels. For example, four television channels may be received as part of a single transponder stream by a single tuner of the television receiver over a same period of time, such as from 7 PM until 10 PM. The specific television channels and the time periods at which the television channels are recorded may be set by the television service provider and transmitted by the television service provider to the television receiver. For example, a user may enable recording of multi-channel recording using a single selection via user interface **455**. The time periods and/or channels that are recorded may be determined based on data received by the television receiver from the television service provider.

In some embodiments, if a user enables such multi-channel recording, additional options may be presented to the user, such as via user interface **475**. A user may be permitted to specify which days of the week and/or which channels (from a predefined group of television channels) are to be recorded. Each television channel listed in user interface **475** may be transmitted to the television receiver as part of a single transponder stream (such that a single tuner of the television receiver may be used to receive each of the television channels over a same period of time). Without requiring the use of an additional tuner, a user may select as many or as few television channels from user interface **475** for recording. These television channels may be recording during overlapping periods of time using a single tuner of the television receiver. While FIG. **4**B illustrates user interface **455** and user interface **475** as displayed separately, it should be understood that multiple user interfaces may be displayed simultaneously by display device **310** (e.g., as part of a same window).

The user may also be able to specify particular days of the week for recording. For example, a user may not want to record particular days of the week because the user does not find any television programming appearing on the selected television channels on such days to be worth recording for future viewing. A user may also be able to define particular television programs to record or not record. For example, a user may be able to specify (e.g., select from a list) a title of a television program that is never to be recorded. In some embodiments, a user may be able to specify that reruns (i.e., television programs that have been previously broadcast by the television channel) are not to be recorded. Whether a television program is a rerun may be based on determining if an "original broadcast date" stored in the EPG information for a television program matches a current date: if the dates match, the television program may not be a rerun, if the original broadcast date is some day in the past, the television program may be a rerun. Based on whether multi-channel recording is enabled by a user, the days of the week selected by a user, and/or the channels that are part of the transponder stream selected by the user, timers may be configured to record the selected television programming. The specific time periods for each television channel (e.g., from 7-10 PM) may be determined by the television service provider and transmitted to the television receiver. The television receiver may receive from the television service provider timers for each day and channel. Timers for days and/or channels that are not selected for recording by the user may be ignored by the television receiver. For example, in illustrated embodiment **400**B, timers related to recording on Saturdays may be ignored. Regardless of the number of television channels selected (from a list of television channels defined by the television service provider) and/or which days of the week (or the number of days of week) selected, only a single tuner may be needed by the television receiver to receive each of the television channels, even if recording occurs on each of the television channels during overlapping periods of time.

The illustrated embodiment **400**B of FIG. **4**B shows one particular arrangement of how various groups may be presented for selection by a user via a display device by a television receiver. The layout, number of groups, groupings of television channels, and/or graphical elements may vary by embodiment. As such, in other embodiments the presentation of on-screen user interfaces **450** and **470** may vary in content, style, and/or layout.

Various methods may be performed using the previously detailed systems and on-screen interfaces. FIG. **5** illustrates an embodiment of a method **500** for recording multiple television channels concurrently. Method **500** may be performed using satellite television distribution system **100** of FIG. **1** or some other form of television distribution system (which may be cable-based). Method **500** may be performed using a television receiver, such as television receiver **200** of FIG. **2**. Each step of method **500** may be performed by a television receiver. In addition to having components similar to television receiver **200** of FIG. **2**, computerized components, such as the components of computer system **900** of FIG. **9** may be incor-

porated as part of the television receiver that performs method **500**. Means for performing method **500** include one or more instances of some or all components of television receiver **200** of FIG. **2** and/or computer system **900** of FIG. **9**.

At step **510**, an indication of television channel groupings may be received by the television receiver. A television service provider may transmit an indication of various television channels which are transmitted to the television receiver via a single transponder stream and, thus, can be received concurrently using a single tuner of the television receiver. Referring to satellite television distribution system **100**, such an indication of the television channel groupings may be transmitted to television receiver **150** via satellite or may use some alternate communication route, such as via network **190**. It should be understood that in other embodiments of method **500**, some other form of communication between a television service provider and a television receiver may be used, such as a cable television network. Such indications of the groups of television channels may be stored by the television receiver, such as by group database **244** of television receiver **200** of FIG. **2**.

In some embodiments, rather than receiving an indication of groups of television channels and storing such an indication in a grouping database, a television receiver may be able to analyze locally stored data to determine which television channels are transmitted to the television receiver on a particular transponder and can be received concurrently using a single tuner. At step **512**, such analysis may include analyzing data present in an NIT, PMT, and/or some other data storage arrangement that is stored by the television receiver that indicates frequencies or satellites and transponders to which particular television channels are assigned. As such, by determining television channels that are associated with a common frequency or indicate a common satellite and transponder, the television receiver may be able to determine which television channels can be recorded concurrently using a single tuner to receive a single transponder stream at step **514**. Further, decryption of control words and/or descrambling using control words may need to be considered as to which television channels can be recorded over the same period of time. For example, it may be necessary for the same control word to be used for descrambling across each television channel within a group. In some embodiments, the results of such a determination may be stored in a group database, such as group database **244** of television receiver **200**.

At step **520**, a graphical user interface (also referred to as an on-screen user interface) may be presented to a user that indicates various groups of television channels for selection. As an example, embodiment **300** of FIG. **3** illustrates such a graphical user interface. Each group may contain multiple television channels. Each of the television channels contained within the group may be transmitted using a single transponder stream. As such, a single tuner may be used to receive (for recording and/or presentation) each television channel within a group concurrently. Via a user input device, a user may be permitted to select one or more groups of television channels for recording. It may be necessary to determine whether sufficient tuners are available at the television receiver to record the groups selected by the user. For instance, if two or more groups are selected and at least two of the groups are to be recorded concurrently, the television receiver may need to have two available tuners to assign two tuners to record the two groups. For example, a tuner may be reserved by the television receiver to allow the user to watch television channels live. As such, to select two groups, a television receiver may be required to have at least three tuners.

At step **530**, selections of one or more groups from the user may be received by the television receiver. In some embodiments, the user may be restricted to selecting a particular number of groups. For example, a user may only be permitted to select a single group for recording. In other embodiments, a user may be able to select 2, 3, 4, 5, or more groups for recording. In some embodiments, a television service provider assigns television channels to particular transponder streams based on categories or some other factor, such as popularity. As such, particular groups of television channels may share characteristics, for example each television channel within a particular group may be devoted to sports, news, or music to name only three examples of categories. Indications of the selected groups of television channels may be stored by the television receiver. In some embodiments, the user is permitted to select particular television channels within a group without selecting the entire group. As such, television channels which are not desired by the user may be ignored and never recorded within a particular group.

At step **540**, indications of the dates and/or times which the selected groups of television channels are to be recorded may be received. In some embodiments, these dates and times may be received from a television service provider, such as via a satellite television distribution system. In various embodiments, the television service provider may define when particular television channels and/or particular groups of television channels are to be recorded. In other embodiments, the indications of date and/or times at which groups of television channels are to be recorded may be received from the user of the television receiver. In some embodiments, the user can provide input indicating whether the dates and times are to be set by the user or are to be set by the television service provider. In some embodiments, the television service provider may provide default times and/or dates and the user may be permitted to modify those default times and/or dates. The indications of the dates and/or times at which the selected groups of television channels are to be recorded may be stored by the television receiver.

At step **550**, timers for recording of each television channel in the selected groups of television channels may be set for the dates and/or times received at step **540**. These timers may be stored by the television receiver. After these timers have been set, it may be permissible for a user to modify the timers and/or cancel recording for a particular date and/or times regardless of whether the dates and/or times were initially specified by the user or by the television service provider.

At step **560**, television channels may be recorded according to the timers set at step **550**. Multiple television channels present within a group selected by the user may be received for recording using a single tuner of the television receiver. As such, if a user selected a group of television channels for recording at step **530** and the indications of the dates and/or times received at step **540** indicate that each of those television channels are to be recorded concurrently, only a single television tuner may be used to concurrently receive each television channel present within the group. For each television channel recorded at step **560**, a separate file may be created on a storage medium of the television receiver. In some embodiments, individual files are created for each television program that is recorded. The start and stop times of particular television programs may be based on EPG data, such as data from EPG database **230** of FIG. **2**.

FIG. **6** illustrates another embodiment of a method for recording multiple television channels concurrently. Method **600** may be performed using satellite television distribution system **100** of FIG. **1** or some other form of television distribution system (which may be cable-based). Method **600** may be performed using a television receiver, such as television receiver **200** of FIG. **2**. Each step of method **600** may be

performed by a television receiver. In addition to having components similar to television receiver **200** of FIG. **2**, computerized components, such as the components of computer system **900** of FIG. **9**, may be incorporated as part of the television receiver that performs method **600**. Means for performing method **600** include one or more instances of some or all components of television receiver **200** of FIG. **2** and/or computer system **900** of FIG. **9**. A television receiver that performs method **500** may also perform method **600**.

At step **610**, an indication of television channel groupings may be received by the television receiver. A television service provider may transmit an indication of various television channels which are transmitted to the television receiver via a single transponder stream and, thus, can be received concurrently using a single tuner of the television receiver. Referring to satellite television distribution system **100**, such an indication of the television channel groupings may be transmitted to television receiver **150** via satellite or may use some alternate communication route, such as via network **190**. It should be understood that in other embodiments of method **600**, some other form of communication between a television service provider and a television receiver may be used, such as a cable television network. Such indications of the groups of television channels may be stored by the television receiver, such as by group database **244** of television receiver **200** of FIG. **2**.

At step **620**, a selection of a television program to record may be received from a user. The selection may be made by the user via an EPG interface. For example, referring to FIG. **4**, and onscreen EPG may be presented that allows a user to select a particular television program broadcast by a television channel over a time period.

At step **630**, multiple other television channels which are broadcast to the television receiver using a same transponder and transponder stream as the television program selected for recording may be determined. These multiple other television channels may be determined based on the indication of groups of television channels received by the television receiver at step **610**, such as by analyzing a grouping database. In other embodiments, rather than receiving an indication of groups of television channels and storing such an indication in a grouping database, a television receiver may be able to analyze locally stored data to determine which television channels are transmitted to the television receiver via a particular transponder and can be received concurrently using a single tuner. Such analysis may include analyzing data present in an NIT, PMT, and/or some other data storage arrangement that is stored by the television receiver that indicates frequencies or satellites and transponders to which particular television channels are assigned. By determining television channels that are associated with a common frequency or indicate a common transponder of a same satellite, the television receiver may be able to determine which television channels can be recorded concurrently using a single tuner to receive a single transponder stream at step **630**. In some embodiments, the results of such a determination may be stored in a grouping database, such as group database **244** of television receiver **200**.

At step **640**, an onscreen interface may be presented to a user that identifies the plurality of television channels determined at step **630** to be broadcast on the same transponder as a television program. As such, at step **640**, the user may be provided with an opportunity to select among the plurality of television channels to identify which additional television channels are to be recorded by the television receiver. Each of these additional television channels to be recorded may be received by the television receiver using the same tuner used to receive the television program selected at step **620**. At step **650**, a selection of one or more television channels that are transmitted to the television receiver via the same transponder stream may be received.

At step **660**, timers for recording of each user selection, including the television program identified at step **620** and the television channels indicated by the selections received at step **650**, may be set by the television receiver. Each timer may include a television channel, a start time, and an end time. The start and end times of timers for the television channels indicated by the selections of step **650** may be adjusted according to method **700** of FIG. **7** such that recording of complete television programs is ensured. In some embodiments, the start and end time of timers of the television channels indicated by the selections of step **650** are set to match the start and end time of the time for the television program identified at step **620** (regardless of whether recording of one or more television programs will be truncated).

At step **670**, television channels may be recorded according to the timers set at step **660**. Each of the television channels/programs selected for recording in method **600** may require only a single tuner be used for receiving the television programming. For each television channel recorded at step **670**, a separate file may be created on a storage medium of the television receiver. In some embodiments, files are created for each television program that is recorded. The start and stop times of particular television programs may be based on EPG data, such as data from EPG database **230** of FIG. **2**.

When embodiments of method **600** are performed, it may be desired to ensure that entire television programs recorded such that beginnings and/or endings of television programs are not truncated from recording. As an example, referring to FIG. **4**, a user has selected television program **410** for recording. This television program begins at 7:30 PM and ends at 10 PM. Therefore a timer is set by the television receiver to record television program **410** that has a start time of 7:30 PM and an end time of 10:00 PM. However, other television channels transmitted to the television receiver via the same transponder and selected for recording by the user may not have the same start and/or end times. For example, television program **412** on WCVV starts at 7 PM and ends at 9 PM. As such, if the user has indicated that WCVV is to also be recorded during the recording of television program **410**, the timing of recording of television channel WCVV may be adjusted such that television program **412** is recorded in its entirety or is omitted from being recorded (rather than having recording start 30 minutes into television program **412**).

FIG. **7** illustrates an embodiment of a method **700** for using electronic programming guide information to ensure entire television programs are recorded. Method **700** may be performed using satellite television distribution system **100** of FIG. **1** or some other form of television distribution system (which may be cable-based). Method **700** may be performed using a television receiver, such as television receiver **200** of FIG. **2**. Each step of method **700** may be performed by a television receiver. In addition to having components similar to television receiver **200** of FIG. **2**, computerized components, such as the components of computer system **900** of FIG. **9** may be incorporated as part of the television receiver that performs method **600**. Means for performing method **700** include one or more instances of some or all components of television receiver **200** of FIG. **2** and/or computer system **900** of FIG. **9**. Method **700** may be performed in conjunction with method **500** of FIG. **5** and/or method **600** of FIG. **6** to ensure entire television programs are recorded. For example, referring to method **500**, at least some steps of method **700** may be

performed as part of step **550**. As another example, referring to method **600**, method **700** may be performed as part of step **660**.

At step **710**, a timer may be set for a first television program. This timer may indicate a start time, an end time, a date, and a television channel. Referring to method **600**, this timer may be set for the television program indicated by the selection of step **620** (that is, the primary television program selected for recording by the user). In embodiments of method **700** as applied to method **500**, rather than setting a first timer for television program at step **710**, a time period indicated for recording as received from a user or from a television service provider may be accessed.

At step **720**, EPG data received and stored by the television receiver may be analyzed to determine start and end times for television programs appearing on the television channels that are to be recorded. Referring to method **600**, each secondary television channel selected for recording at step **650** may have associated EPG data retrieved and/or analyzed.

At step **730**, for each selected television channel to be recorded (such as television channels indicated to be recorded at step **650**), it may be determined whether a television program begins at the start time of the first record timer or at an earlier time. For example, referring to embodiment **400** of FIG. **4**, a timer for television program **410** begins at 7:30 PM. On ETV, a television channel selected for recording, a television program begins at a same time as the start time for the timer. However, referring to WCVV, the television program broadcast at 7:30 begins at 7:00 PM.

If, at step **730**, for a secondary television channel to be recorded, it is determined the start time of a scheduled television program on the secondary television channel matches the start time of the timer set at step **710** for the television program on the primary television channel, method **700** may proceed to step **740**. At step **740**, a start time for a record timer for the secondary television channel to be recorded may be set to match the start time for the record timer of the primary television channel.

If, at step **730**, for a secondary television channel to be recorded, it is determined that a scheduled television program on the secondary television channel will be in progress (according to stored EPG information) at the start time of the timer set at step **710** for the television program on the primary television channel, method **700** may proceed to step **745**. At step **745**, an earlier start time may be set for the record timer for the secondary television channel to match a start time of the television program that is scheduled to be in progress at the start time of the timer set at step **710**. The same tuner that will record the first television program may be used to receive each secondary television channel. In some embodiments, rather than setting an earlier start time, a later start time may be set for the record timer for the secondary television channel such that recording of the entire television program that is scheduled to be in progress at the start time of the timer set at step **710** is omitted (thus resulting in a start time for the timer for the secondary television channel being set that is later than the start time of the timer set at step **710**). Still, the same tuner that records the first television channel will be used for receiving each secondary television channel.

After step **740** or step **745**, step **750** may be performed. At step **750**, for each selected television channel to be recorded (such as television channels indicated to be recorded at step **650**), it may be determined whether a television program ends at the end time of the first record timer or at a later time. For example, referring to embodiment **400** of FIG. **4** a timer for television program **410** ends at 10:00 PM. On ETV, a television channel selected for recording, a television program ("Golf News") ends at a same time as the end time for the timer. However, referring to "MGN", the television program broadcast at 9:30 may go until 10:30 PM.

If, at step **750**, for a secondary television channel to be recorded, it is determined the end time of a scheduled television program on the secondary television channel matches the end time of the timer set at step **710** for the television program on the primary television channel, method **700** may proceed to step **760**. At step **760**, an end time for a record timer for the secondary television channel to be recorded may be set to match the end time for the record timer of the primary television channel.

If, at step **750**, for a secondary television channel to be recorded, it is determined that a scheduled television program on the secondary television channel will be in progress according to stored EPG information at the end time of the timer set at step **710** for the television program on the primary television channel, method **700** may proceed to step **765**. At step **765**, a later end time may be set for the record timer for the secondary television channel to match an end time of the television program that is scheduled to be in progress at the end time of the timer set at step **710**. In some embodiments, rather than setting a later end time, a time may be set for the record timer for the secondary television channel such that recording of the entire television program that is scheduled to be in progress at the end time of the timer set at step **710** is omitted (thus resulting in an end time for the timer for the secondary television channel being set that is earlier than the end time of the timer set at step **710**).

Steps **730** through **765** of method **700** may be performed for each secondary television channel to be recorded. The previous description of method **700** focuses on performing steps of method **700** in conjunction with method **600**. However, method **700** may also be performed in conjunction with method **500** of FIG. **5**. If method **700** is performed in conjunction with method **500**, rather than setting a first timer at step **710** for a primary channel, method **700** may begin at step **720** with EPG data being analyzed for each television program to be recorded over a period of time defined by either the television service provider or by a user. The start and end times for recording may, by default, be set for the start of the period of time and the end of the period of time, respectively, defined by the television service provider or user. Steps **720** through **765** may be used to adjust the start time and end time of the recording time period defined by the user or the television service provider such that only complete television programs are recorded.

FIG. **8** illustrates an embodiment of a method **800** for recording multiple television channels based on user input. Method **800** may be performed using satellite television distribution system **100** of FIG. **1** or some other form of television distribution system (which may be cable-based). Method **800** may be performed using a television receiver, such as television receiver **200** of FIG. **2**. Each step of method **800** may be performed by a television receiver. In addition to having components similar to television receiver **200** of FIG. **2**, computerized components, such as the components of computer system **900** of FIG. **9** may be incorporated as part of the television receiver that performs method **800**. Means for performing method **800** include one or more instances of some or all components of television receiver **200** of FIG. **2** and/or computer system **900** of FIG. **9**. Method **800** may include the use of user interfaces similar to presented in FIG. **4**B.

At step **810**, an indication of a group of television channels that are transmitted as part of a same transponder stream may be received by the television receiver. A television service

provider may transmit an indication of various television channels which are transmitted to the television receiver via a single transponder stream and, thus, can be received during a same time period (econcurrently) using a single tuner of the television receiver. Referring to satellite television distribution system **100**, such an indication of the television channel groupings may be transmitted to television receiver **150** via satellite or may use some alternate communication route, such as via network **190**. It should be understood that in other embodiments of method **800**, some other form of communication between a television service provider and a television receiver may be used, such as a cable television network. As such, a transponder stream may refer to a stream of television channels transmitted using a single RF channel of the cable network. Such indications of the groups of television channels may be stored by the television receiver, such as by group database **244** of television receiver **200** of FIG. **2**.

At step **820**, a graphical user interface may be presented to the user by the television receiver (e.g., via a display device) that permits the user to enable or disable multiple channel recording. A single user input may either enable or disable recording of multiple television channels, possibly over an overlapping time period (e.g., daily from 7-10 PM on each of the television channels). Which television channels and the date/time periods over which the television channels are recorded may be defined, at least as a default, by the television service provider. Each of the eligible television channels may be transmitted as part of a particular transponder stream.

At step **825**, it may be determined by the television receiver whether the user has selected to enable or disable recording of the multiple channels received using a single tuner of the television receiver. If the user has provided input that disables recording of the multiple channels, method **800** may proceed to step **827**. At step **827**, no timers may be set for future recording of the multiple channels (e.g., timer data received from the television service provider may be ignored or stored but disabled). Further, any timers previously set for future recording of the multiple channels may be deleted or disabled. If the user has provided input that enables recording of the multiple channels, method **800** may proceed to step **830**.

In some embodiments, the television channels, dates, and time periods for recording are determined by the television service provider. As such, following step **825**, method **800** may proceed to step **850** in which timers are set according to dates, time periods, and/or television channels that are specified by the television service provider via data that is transmitted by the television service provider to television receiver. In other embodiments, the user may be able to modify which television channels and/or on which dates television channels are recorded. At step **830**, another graphical user interface (or an option as part of the same user interface) may be provided that requests the user specify particular days on which recording of the multiple channels is to occur. The user may have the opportunity to specify any combination of days of the week for recording. The user may be able specify that every day of the week is recorded. In some embodiments, the user may provide input for each day of the week which indicates that recording of the multiple channels is enabled or disabled. The time periods on the individual days for recording may be specified by the television service provider (or, in some embodiments, a user may be permitted to indicate the desired periods of time for recording of the television channels). Each time period may include times during which multiple television programs are broadcast. For example, during a time period of 7:00 PM-10:00 PM a particular television channel may broadcast three to six television programs. At step **835**, user input may be received by the television receiver that indicates which days of the week the multiple television channels are to be recorded, during which recording, a single tuner for reception of the television channels is used by the television receiver.

At step **840**, a user interface may be provided that requests the user specify particular television channels of the multiple channels is to occur. The user may have the opportunity to specify any combination of television channels from the predefined group of television channels. The group of television channels may include only television channels that are transmitted as part of a particular transponder stream. The television channels which are part of the group may have been indicated to the television receiver at step **810**. Since the television channels are received as part of the same transponder stream, regardless of the combination of television channels selected by the user, the television channels may be received over at least an overlapping period of time using a single tuner of the television receiver. At step **845**, user input may be received by the television receiver that indicates which television channels of the multiple television channels are to be recorded, using a single tuner for reception of the selected television channels.

At step **850**, timers may be set for recording of the television channels. Timers may only be set at the set top box for television channels of the multiple television channels selected by the user and only on days selected by the user. The specific time periods for each day may be set by the television service provider. The time periods at which the television channels are recorded may either partially or fully overlap. By the time periods at least partially overlapping, an overlapping time period during which each of the television channels is to be recorded may be defined. For example, each of the television channels may be recorded from 7 PM until 10 PM nightly. The timer set at step **850** may result in channel specific files being recorded for each television channel selected by the user, wherein each channel specific file contains multiple television programs broadcast during the time period recorded by the television receiver. Data used to create timers may be received from the television service provider for recording of each television channel of the multiple television channels for each day of the week. Data for timers related to television channels not selected by the user and/or data for timers on days not selected by the user may be ignored (or stored but disabled), such that timers are only set on the television channels and/or days selected by the user. If, at some point, the user modifies the television channels and/or days selected for recording, one or more corresponding disabled timers may be enabled for recording. At step **855**, the television receiver may record the television channels in accordance with the timers set at step **850**. Once recorded based on the timers, the recordings of the television channels may be available for playback and output to a display device.

FIG. **9** illustrates an embodiment of a computer system **900**. A computer system as illustrated in FIG. **9** may be incorporated as part of the previously described computerized devices. For example, computer system **900** can represent some of the components of the television receivers and/or television service provider systems discussed in this application. FIG. **9** provides a schematic illustration of one embodiment of a computer system **900** that can perform various steps of the methods described herein. It should be noted that FIG. **9** is meant only to provide a generalized illustration of various components, any or all of which may be utilized as appropriate. FIG. **9**, therefore, broadly illustrates how individual system elements may be implemented in a relatively separated or relatively more integrated manner.

The computer system **900** is shown comprising hardware elements that can be electrically coupled via a bus **905** (or may otherwise be in communication, as appropriate). The hardware elements may include one or more processors **910**, including without limitation one or more general-purpose processors and/or one or more special-purpose processors (such as digital signal processing chips, graphics acceleration processors, and/or the like); one or more input devices **915**, which can include without limitation a mouse, a keyboard, and/or the like; and one or more output devices **920**, which can include without limitation a display device, a printer, and/or the like.

The computer system **900** may further include (and/or be in communication with) one or more non-transitory storage devices **925**, which can comprise, without limitation, local and/or network accessible storage, and/or can include, without limitation, a disk drive, a drive array, an optical storage device, a solid-state storage device, such as a random access memory ("RAM"), and/or a read-only memory ("ROM"), which can be programmable, flash-updateable and/or the like. Such storage devices may be configured to implement any appropriate data stores, including without limitation, various file systems, database structures, and/or the like.

The computer system **900** might also include a communications subsystem **930**, which can include without limitation a modem, a network card (wireless or wired), an infrared communication device, a wireless communication device, and/or a chipset (such as a Bluetooth™ device, an 802.11 device, a WiFi device, a WiMax device, cellular communication facilities, etc.), and/or the like. The communications subsystem **930** may permit data to be exchanged with a network (such as the network described below, to name one example), other computer systems, and/or any other devices described herein. In many embodiments, the computer system **900** will further comprise a working memory **935**, which can include a RAM or ROM device, as described above.

The computer system **900** also can comprise software elements, shown as being currently located within the working memory **935**, including an operating system **940**, device drivers, executable libraries, and/or other code, such as one or more application programs **945**, which may comprise computer programs provided by various embodiments, and/or may be designed to implement methods, and/or configure systems, provided by other embodiments, as described herein. Merely by way of example, one or more procedures described with respect to the method(s) discussed above might be implemented as code and/or instructions executable by a computer (and/or a processor within a computer); in an aspect, then, such code and/or instructions can be used to configure and/or adapt a general purpose computer (or other device) to perform one or more operations in accordance with the described methods.

A set of these instructions and/or code might be stored on a non-transitory computer-readable storage medium, such as the non-transitory storage device(s) **925** described above. In some cases, the storage medium might be incorporated within a computer system, such as computer system **900**. In other embodiments, the storage medium might be separate from a computer system (e.g., a removable medium, such as a compact disc), and/or provided in an installation package, such that the storage medium can be used to program, configure, and/or adapt a general purpose computer with the instructions/code stored thereon. These instructions might take the form of executable code, which is executable by the computer system **900** and/or might take the form of source and/or installable code, which, upon compilation and/or installation on the computer system **900** (e.g., using any of a variety of generally available compilers, installation programs, compression/decompression utilities, etc.), then takes the form of executable code.

It will be apparent to those skilled in the art that substantial variations may be made in accordance with specific requirements. For example, customized hardware might also be used, and/or particular elements might be implemented in hardware, software (including portable software, such as applets, etc.), or both. Further, connection to other computing devices such as network input/output devices may be employed.

As mentioned above, in one aspect, some embodiments may employ a computer system (such as the computer system **900**) to perform methods in accordance with various embodiments of the invention. According to a set of embodiments, some or all of the procedures of such methods are performed by the computer system **900** in response to processor **910** executing one or more sequences of one or more instructions (which might be incorporated into the operating system **940** and/or other code, such as an application program **945**) contained in the working memory **935**. Such instructions may be read into the working memory **935** from another computer-readable medium, such as one or more of the non-transitory storage device(s) **925**. Merely by way of example, execution of the sequences of instructions contained in the working memory **935** might cause the processor(s) **910** to perform one or more procedures of the methods described herein.

The terms "machine-readable medium" and "computer-readable medium," as used herein, refer to any medium that participates in providing data that causes a machine to operate in a specific fashion. In an embodiment implemented using the computer system **900**, various computer-readable media might be involved in providing instructions/code to processor(s) **910** for execution and/or might be used to store and/or carry such instructions/code. In many implementations, a computer-readable medium is a physical and/or tangible storage medium. Such a medium may take the form of a non-volatile media or volatile media. Non-volatile media include, for example, optical and/or magnetic disks, such as the non-transitory storage device(s) **925**. Volatile media include, without limitation, dynamic memory, such as the working memory **935**.

Common forms of physical and/or tangible computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic medium, a CD-ROM, any other optical medium, any other physical medium with patterns of marks, a RAM, a PROM, EPROM, a FLASH-EPROM, any other memory chip or cartridge, or any other medium from which a computer can read instructions and/or code.

Various forms of computer-readable media may be involved in carrying one or more sequences of one or more instructions to the processor(s) **910** for execution. Merely by way of example, the instructions may initially be carried on a magnetic disk and/or optical disc of a remote computer. A remote computer might load the instructions into its dynamic memory and send the instructions as signals over a transmission medium to be received and/or executed by the computer system **900**.

The communications subsystem **930** (and/or components thereof) generally will receive signals, and the bus **905** then might carry the signals (and/or the data, instructions, etc. carried by the signals) to the working memory **935**, from which the processor(s) **910** retrieves and executes the instructions. The instructions received by the working memory **935** may optionally be stored on a non-transitory storage device **925** either before or after execution by the processor(s) **910**.

It should further be understood that the components of computer system **900** can be distributed across a network. For example, some processing may be performed in one location using a first processor while other processing may be performed by another processor remote from the first processor. Other components of computer system **900** may be similarly distributed.

The methods, systems, and devices discussed above are examples. Various configurations may omit, substitute, or add various procedures or components as appropriate. For instance, in alternative configurations, the methods may be performed in an order different from that described, and/or various stages may be added, omitted, and/or combined. Also, features described with respect to certain configurations may be combined in various other configurations. Different aspects and elements of the configurations may be combined in a similar manner. Also, technology evolves and, thus, many of the elements are examples and do not limit the scope of the disclosure or claims.

Specific details are given in the description to provide a thorough understanding of example configurations (including implementations). However, configurations may be practiced without these specific details. For example, well-known circuits, processes, algorithms, structures, and techniques have been shown without unnecessary detail in order to avoid obscuring the configurations. This description provides example configurations only, and does not limit the scope, applicability, or configurations of the claims. Rather, the preceding description of the configurations will provide those skilled in the art with an enabling description for implementing described techniques. Various changes may be made in the function and arrangement of elements without departing from the spirit or scope of the disclosure.

Also, configurations may be described as a process which is depicted as a flow diagram or block diagram. Although each may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the operations may be rearranged. A process may have additional steps not included in the figure. Furthermore, examples of the methods may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware, or microcode, the program code or code segments to perform the necessary tasks may be stored in a non-transitory computer-readable medium such as a storage medium. Processors may perform the described tasks.

Having described several example configurations, various modifications, alternative constructions, and equivalents may be used without departing from the spirit of the disclosure. For example, the above elements may be components of a larger system, wherein other rules may take precedence over or otherwise modify the application of the invention. Also, a number of steps may be undertaken before, during, or after the above elements are considered. Accordingly, the above description does not bind the scope of the claims.

What is claimed is:

1. A television receiver configured to record television channels, the television receiver comprising:

a tuner;

one or more processors; and

a memory communicatively coupled with and readable by the one or more processors and having stored therein processor-readable instructions which, when executed by the one or more processors, cause the one or more processors to:

cause a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of multiple television channels, wherein:

each of the multiple television channels are transmitted as part of a single transponder stream that is configured to be received by the tuner; and

each of the multiple television channels is associated with a different video packet identifier (PID);

receive a first user input, in response to the first user interface, that enables the single selection option wherein the single selection option recording of the multiple television channels;

receive, from the television service provider, data indicating time periods during which the multiple television channels are to be recorded when the single selection option is enabled, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded;

set a plurality of record timers for the multiple television channels based on enablement of the single selection option and the data indicating time periods received from the television service provider, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded; and

cause the multiple television channels to be recorded based on the plurality of record timers.

2. The television receiver configured to record television channels of claim **1**, wherein the processor-readable instructions configured to cause the one or more processors to set the record timer comprises processor-readable instructions configured to cause the one or more processors to:

receive, from the television service provider, data indicating time periods for a day during which each television channel of the multiple television channels are to be recorded, wherein on the day each time period overlaps, thereby defining an overlapping time period;

set record timers for each television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the time periods; and

cause each television channel of the multiple television channels to be recorded based on the record timers, wherein each television channel of the multiple television channels is received by the television receiver using the tuner during the overlapping time period.

3. The television receiver configured to record television channels of claim **2**, wherein the processor-readable instructions configured to cause the one or more processors to set the record timer comprises processor-readable instructions configured to cause the one or more processors to:

after setting the record timers for each television channel of the multiple television channels, receive a second user input disabling the option for recording of the multiple television channels; and

in response to the second user input, disable timers for each television channel of the multiple television channels that were set based on the user input enabling recording of multiple television channels and the data indicating the time periods received from the television service provider.

4. The television receiver configured to record television channels of claim **1**, wherein each television channel of the multiple television channels is associated with a different audio packet identifier.

5. A method for recording television channels, the method comprising:

causing, by a television receiver, a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of the multiple television channels, wherein:

each of the multiple television channels are transmitted as part of a single transponder stream that is configured to be received by a tuner of the television receiver; and

each of the multiple television channels is associated with a different video packet identifier (PID);

receiving, by the television receiver, a first user input, in response to the first user interface, that enables the single selection option wherein the single selection option enables recording of the multiple television channels;

receiving, by the television receiver from the television service provider, data indicating time periods during which the multiple television channels are to be recorded when the single selection option is enabled, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded;

setting, by the television receiver, a plurality of record timers for the multiple television channels based on enablement of the single selection option and the data indicating time periods received from the television service provider, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded; and

recording, by the television receiver, the multiple television channels based on the plurality of record timers.

6. The method for recording television channels of claim 5, the method further comprising:

receiving, by the television receiver from the television service provider, data indicating time periods for a day during which each television channel of the multiple television channels are to be recorded, wherein on the day each time period overlaps, thereby defining an overlapping time period;

setting, by the television receiver, record timers for each television channel of the multiple television channels based on the user input enabling recording of multiple television channels and the time periods; and

recording, by the television receiver each television channel of the multiple television channels based on the record timers, wherein each television channel of the multiple television channels is received by the television receiver using the tuner during the overlapping time period.

7. The method for recording television channels of claim 6, the method further comprising:

after setting the record timers for each television channel of the multiple television channels, receiving, by the television receiver, a second user input disabling the option for recording of the multiple television channels; and

in response to the second user input, disabling, by the television receiver, timers for each television channel of the multiple television channels that were set based on the user input enabling recording of multiple television channels and the data indicating the time periods received from the television service provider.

8. A non-transitory processor-readable medium for recording television channels, comprising processor-readable instructions configured to cause one or more processors to:

cause a first user interface to be presented via a display device, the first user interface comprising a single selection option that enables recording of the multiple television channels, wherein

each of the multiple television channels are transmitted as part of a single transponder stream that is configured to be received by the tuner; and

each of the multiple television channels is associated with a different video packet identifier (PID);

receive a first user input, in response to the first user interface, that enables the single selection option wherein the single selection option enables recording of the multiple television channels;

receive, from the television service provider, data indicating time periods during which the multiple television channels are to be recorded when the single selection option is enabled, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded;

set a plurality of record timers for the multiple television channels based on enablement of the single selection option and the data indicating time periods received from the television service provider, wherein each record timer of the plurality of record timers causes multiple television programs to be recorded; and

cause the multiple television channels to be recorded based on the plurality of record timers.

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